CHILD POVERTY MONITOR 2013 TECHNICAL REPORT

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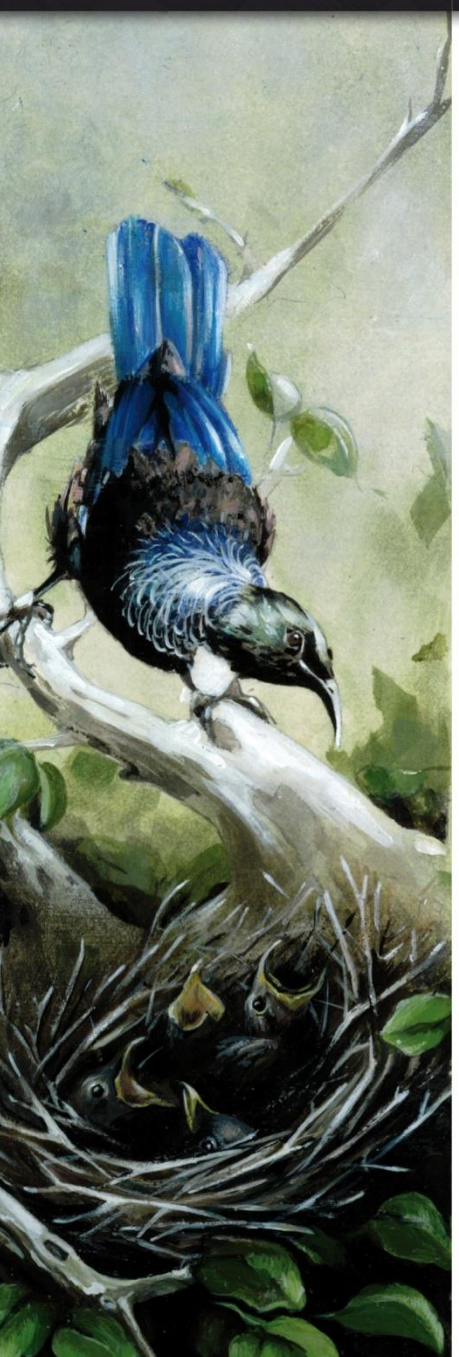


WELCOME TO THE FIRST CHILD POVERTY MONITOR TECHNICAL REPORT

This Technical Report marks a new step in monitoring child poverty and social health indicators in New Zealand. It began with a partnership being established between the Office of the Children's Commissioner, the University of Otago's New Zealand Child and Youth Epidemiology Service (NZCYES) and the J R McKenzie Trust. This partnership saw a gap in publicly-available child poverty measures, and is addressing this gap by compiling, publishing and disseminating annual measurements on child poverty in New Zealand.

Last year, the Children's Commissioner's Expert Advisory Group (EAG) on Solutions to Child Poverty recommended that a suite of measures capturing different aspects of child poverty be measured and reported annually. We are fulfilling this recommendation. This new Technical Report builds on the Children's Social Health Monitor (CSHM) produced by the NZCYES since 2009. We have added additional indicators that enable us to monitor child poverty in New Zealand. Along with this full Technical Report, which is available at www.nzchildren.co.nz, we have produced very high level information on the key measures of child poverty, which are available at www.childpoverty.co.nz.

We want to promote the common use of rigorous measures of poverty, so we can stop debating about the measure and start fixing the problem.

What this Technical Report Covers

This Report provides data and technical information on child poverty measures, economic indicators, and child health measures. It builds on the information in previous Children's Social Health Monitor updates, so that the same data is still compiled and reported consistently (see **Appendix 1**). This Technical Report, however, adds new dimensions around child poverty measures.

The child poverty measures included align closely to the recommendation of the EAG to have a suite of measures to capture different aspects of child poverty. We have included measures on income poverty, material hardship, severity and persistence of child poverty. For these elements, we rely heavily on data available in the Ministry of Social Development report *Household Incomes in New Zealand: Trends in Indicators of Inequality and Hardship 1982 to 2012* [2].

The health and wellbeing indicators look at hospital admissions and deaths from conditions associated with child poverty, including some infectious and respiratory diseases and injuries; the assault, neglect and maltreatment of children; and infant mortality. For each outcome, there are large disparities for children from more economically deprived areas, and for Māori and Pasifika children. Monitoring such health outcomes is entirely appropriate, as they are the early signs of the consequences of children living in poverty. Over time, we will look to include additional indicators of child poverty, related to issues such as education, housing, social inclusion, disability and quality of life.

The report currently comprises poverty and living standards, economic context and health and wellbeing indicators, which are presented as follows:

Overview of the Technical Report's Key Findings

Table 1 provides an overview of the key findings of this year's Child Poverty Monitor Technical Report, while the sections below briefly summarise the differences between the previous CHSM and this year's Technical Report.

Differences between the CSHM and the Child Poverty Technical Report

Expanded Sections on Child Poverty

This Technical Report (when compared to the CSHM) has been expanded to ensure that information is provided on each of the four child poverty measures recommended by the Children's Commissioner's EAG on Solutions to Child Poverty. This has resulted in additional information on children's exposure to material deprivation, as well as two new measures assessing poverty severity and persistence.

Changes in Clinical Coding for Hospital Admissions and Mortality Data

A number of additional ICD-10-AM codes have been included in the Technical Report, to ensure it remains in line with evolving clinical practice and the reporting conventions of other Government Agencies. These additions mean that the rates presented here are not directly comparable with the previous CSHM. However, all of the changes have been applied to the data retrospectively, to ensure continuity in trends within the current report. These changes are outlined below, with further detail being provided in **Appendix 2**.

2013 Changes to the Monitor's Coding Conventions

1. **Expanding *Asthma* to *Asthma and Wheeze***: In line with overseas recommendations, NZ paediatricians have begun to move away from diagnosing asthma in pre-school children, instead calling it viral induced wheeze. Over the past 3–4 years, this has resulted in a large increase in hospitalisations for wheeze in children 0–4 years, and a corresponding fall in hospitalisations for asthma. In the Technical Report, a new category has thus been created which includes both asthma and wheeze (previously only asthma was included), to minimise the impact of this diagnostic shift on time series analysis.
2. **Adding *Unspecified Lower Respiratory Infections (J22)*:** The ICD-10-AM code J22 was not initially included in the CSHM, as it was not present in ICD-9, and thus could not be used for long term (pre 2000) time series analysis. However, given the significant overlap between J18.9 Unspecified Pneumonia (previously included) and J22 Unspecified Lower Respiratory Tract Infections (not previously included), and the fact that the majority of hospital admissions are now coded in ICD-10-AM, J22 has been included in the Technical Report.
3. **Adopting the CYMRC's SUDI Coding Conventions**: In 2013, the Child and Youth Mortality Review Committee (CYMRC) recommended a common set of sudden unexpected death in infancy (SUDI) codes for reporting in the health sector. This has resulted in the addition of two new codes to the original CSHM's SUDI algorithms (W78: Inhalation of Gastric Contents; and W79: Inhalation and Ingestion of Food Causing Obstruction of the Respiratory Tract). In numerical terms (3 extra cases over a 5 year period), the impact of these changes is small.

Expanded Section on Hospital Admissions in Infants Aged 29–364 Days

The cancellation of the 2011 Census impacted significantly on the availability of population denominators for time series analysis. In this report, Statistics NZ's population projections have been used when exploring health outcomes for children aged 0–14 years. However, these projections are not available by NZ Deprivation Index decile (NZDep), making it difficult to assess the extent of current health inequalities for children. Further, it is likely the accuracy of these projections lessens, with each year they move beyond the 2006 Census, meaning that the rates presented for children 0–14 years may change, once updated population denominators become available in 2014.

In contrast, the Birth Registration Dataset collates information on the number of babies born in New Zealand each year, thereby providing an up-to-date population denominator for infants aged less than one year. Information can be further broken down by region, ethnicity and NZDep, allowing a detailed analysis of inequalities in infant health outcomes. Given the particular vulnerability of infants to many of the socioeconomic determinants of health, and the availability of a suitable denominator, this Technical Report contains an

expanded section on hospital admissions for socioeconomically sensitive medical conditions in babies aged 29–364 days.

Expanded Section on Assault, Neglect and Maltreatment in Children 0–4 Years

The previous CSHM monitored hospitalisations for injuries arising from the assault, neglect or maltreatment of children 0–14 years due to concerns about the impacts of socioeconomic factors on family cohesion. In this earlier analysis, children discharged directly from the Emergency Department (ED), or without an injury as the primary diagnosis were excluded. The rationale for the inpatient injury focus was because of inconsistencies in the way different DHBs upload their ED cases to the hospital admission dataset (the NMDS) and because inpatient injuries were seen as a measure of serious harm, which could be monitored consistently over time.

With Government policy increasingly focusing on the early identification of children vulnerable to abuse, and with the consistency of ED uploading to the NMDS improving, this Technical Report, in addition to updating the previous inpatient injury indicator, includes an expanded section on hospitalisations for assault, neglect and maltreatment in children aged 0–4 years. This expanded section reviews all hospital admissions in children aged 0–4 years with an external cause code of intentional injury, irrespective of whether they were admitted to the ward or discharged directly from the ED, or whether they had an injury or another condition (e.g. gastroenteritis) listed as their primary diagnosis. Further detail on the rationale for broadening the focus of this indicator is provided on **Page 88**.

In February 2014, Treasury and Statistics NZ advised there had been an error in the calculation of household incomes, which impacted on income inequality and child poverty rates for 2010–2012 [1]. The figures presented here, which have been revised to include the corrected data, may thus differ from those presented in previous NZCYES reports.

Table 1. Overview of the Key Findings of the Child Poverty Monitor 2013 Technical Report

Indicator	New Zealand Distribution and Trends
Child Poverty and Living Standards	
Income Based Poverty Measures	• In 2012, 285,000 children aged 0–17 years lived in poverty (using the <60% contemporary median after housing costs measure). This equated to 27% of all New Zealand children. • During 2010 to 2012 (using the AHC 60% fixed line measure), around 34% of Māori and 34% of Pacific children lived in poor households, as compared to 17% of European children. • Child poverty rates were also higher for younger children (0–6 years and 7–11 years vs.12–17 years), larger households (3+ children vs. 1–2 children), sole parent households (vs. two parent households) and for those in households where no adults were in paid work or where none worked full time (vs. self-employed or 1+ full time).
Material Hardship	• In the 2008 Living Standards Survey, 22% of children lived in families experiencing material hardship (i.e. scoring four or more on a composite deprivation index measuring a range of "enforced lacks"). • When broken down by individual item, those children experiencing material hardship had much higher exposures to household economising behaviours such as having to wear worn out shoes or clothing, sharing a bed, cutting back on fresh fruit and vegetables and postponing doctor's visits because of cost. • The NZ Household Economic Survey (NZHES) used a short form of the Economic Living Standards Index (ELSI). Households were considered to be in hardship if they experienced six or more enforced lacks from a list of 16 items. Using the abbreviated ELSI, 17% of children aged 0–17 years were considered to be in material hardship in 2012, with this equating to around 180,000 children. • As a group, children experiencing material hardship were exposed to a range of economising behaviours including cutting back on fresh fruit, vegetables and meat, not replacing worn out clothes, not having at least two pairs of shoes in good repair, having to put up with feeling cold, and postponing doctor's visits because of cost.
Poverty Severity	• In the absence of more robust measures, one approach to assessing the severity of child poverty is to select an income threshold lower than the traditional 60% cut-off. Where all else is the same, children in households with incomes below the 50% threshold will experience greater material disadvantage than those just below the 60% threshold. • Using the <50% poverty measure, during the 1980s child poverty rates were similar before (BHC) and after (AHC) adjusting for housing costs. However, from 1992 onwards, child poverty rates were much higher after adjusting for housing costs, with the most rapid rises in child poverty between 1990 and 1994 being seen when the AHC measure was used. Thus in 2012, while child poverty rates were similar to the early 1980s using the BHC measure, they were much higher than in the 1980s when the AHC measure was used. • During 2007–2011 child poverty rates increased (<50% AHC measure), with 20% of children living in severe poverty during 2012.

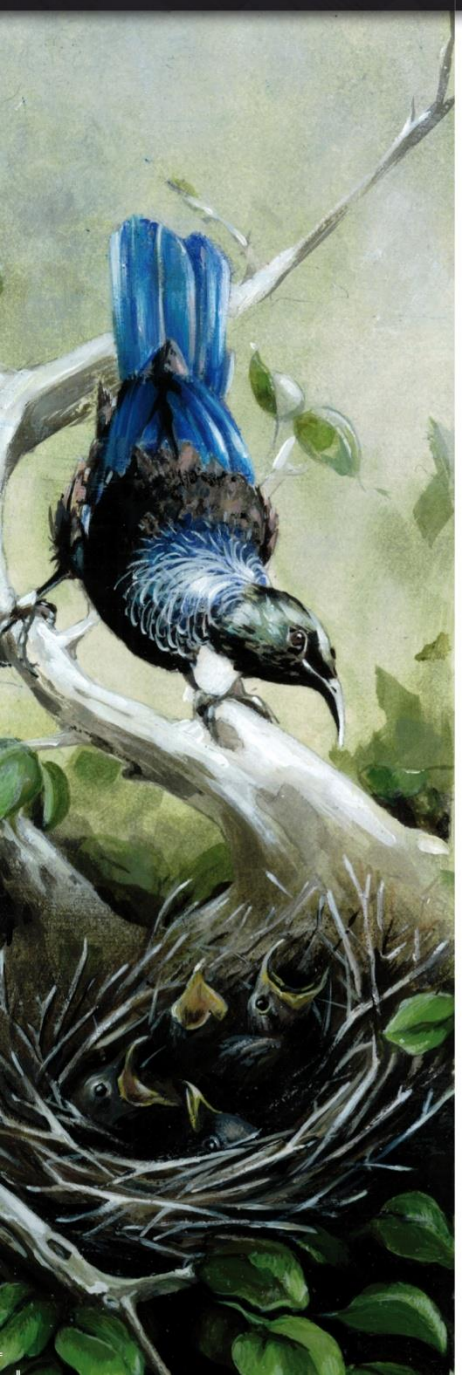
Indicator	New Zealand Distribution and Trends
Poverty Persistence	• Most child poverty measures are based on the NZHES, which samples a different set of households each survey, making it difficult to explore poverty persistence. However, Statistics NZ's Survey of Family, Income and Employment (SoFIE), which began in 2002, follows the same group of people from one survey to the next. Data is available for seven years, from 2002–2003 to 2008–2009. • In SoFIE, people whose income was below the average low income line (<50% of the gross for the year under review), when averaged across all seven years, were said to be in persistent poverty. An individual was said to be in current poverty if they fell below the income poverty line for which ever individual year was being considered. • When averaged across all seven SoFIE years, 16% of children who were aged 0–11 years in Year 1 (2002–2003), were found to be in persistent poverty and 19% in current poverty (using the <50% gross threshold). The reason for this discrepancy was because in any given year, those in poverty comprise a mix of those who have transiently moved into poverty and will move out in later surveys, and those who are living in long term poverty. • In any one year, 60% of those in current poverty were also in persistent poverty (using the 50% gross median threshold). There was also a further group of children that, while not in poverty in the current year, were exposed to persistent poverty when averaged over the seven survey years. • These findings suggest that three out of five children currently living in poverty will remain this way for many years.
Wider Economic Context	
Gross Domestic Product (GDP)	• GDP grew by 0.2% in the June quarter of 2013. • Economic activity for the year ending June 2013 increased by 2.7%, when compared to the year ending June 2012.
Income Inequality	• In New Zealand during 1982–2012 income inequality, as measured by the P80/P20 ratio and Gini coefficient, was higher after adjusting for housing costs, as housing costs make up a greater proportion of household income for lower income than for higher income households. • The most rapid rises in income inequality occurred between the late 1980s and early 1990s. Income inequality then fell between 2004 and 2007, possibly due to improving employment and the impact of the Working for Families package. • During 2009–2012, there was some volatility in income inequality, as a result of the impact of the global financial crisis, Christchurch earthquakes and associated economic downturn and recovery on different parts of the income distribution.
Unemployment Rates	• In the September 2013 quarter, the seasonally adjusted unemployment rate fell to 6.2%, while seasonally adjusted unemployment numbers decreased from 154,000 in the June 2013 quarter, to 150,000 in the September quarter. • Unemployment rates were higher for Māori and Pacific people than for Asian/Indian and then European people. • Unemployment rates were also higher for younger people (15–19 years > 20–24 years > 25–29 years > 35–49 years) and those with no qualifications > school, or post school but no school qualifications > post school and school qualifications.

Indicator	New Zealand Distribution and Trends
Children Reliant on Benefit Recipients	• In contrast to the increases seen during 2008–2010, the proportion of children aged 0–17 years reliant on a benefit recipient fell between June 2010 and June 2013 (from 21.6% to 20.1%). • In June 2013, 214,746 children aged 0–17 years were reliant on a benefit recipient. This equated to 20.1% of all New Zealand children. • The proportion of children reliant on a benefit recipient was highest for those 1–4 years. Rates then tapered off gradually during middle to late childhood, and then more steeply after 12 years of age.
Health and Wellbeing	
Hospitalisations and Mortality with a Social Gradient in Children 0–14 Years	• During 2008–2012, asthma/wheeze, bronchiolitis and gastroenteritis were the leading reasons for hospitalisations for medical conditions with a social gradient in children aged 0–14 years, with the majority of admissions being for infectious and respiratory diseases. Falls were the leading causes of injury admissions with a social gradient. • During 2006–2010, SUDI was the leading cause of mortality with a social gradient in children 0–14 years. Vehicle occupant injuries were the leading causes of injury-related deaths, while pneumonia was the leading reason for deaths from medical conditions. • Medical admissions increased during the early 2000s, reached a peak in 2002, and then declined. An upswing was again evident during 2007–2012. In contrast, injury admissions declined throughout 2000–2012. Note: The exclusion of Emergency Department cases from injury admissions may have been partly responsible for these diverging trends. • Hospitalisations for medical conditions and injuries with a social gradient were consistently higher for Pacific > Māori > European/Other and Asian/Indian children. Rates were also higher for males than for females. • For Pacific children, medical admissions increased during the early 2000s, reached a peak in 2003 and then declined. An upswing in rates was evident during 2007–2009. For Māori children, rates were static during the mid-2000s, but increased during 2007–2009. For European/Other and Asian/Indian children rates were static during the mid-2000s but increased during 2007–2012. • While injury admissions declined for Pacific, Māori and European/Other children during 2000–2012, the rate of decline was faster for European/Other, followed by Māori children. Thus ethnic differences were greater in 2012 than in 2000.

Indicator	New Zealand Distribution and Trends
Hospital Admissions for Medical Conditions with a Social Gradient in Infants Aged 29–364 Days	• Bronchiolitis was the leading reason for hospitalisations for medical conditions with a social gradient in post-neonatal infants, accounting for 41.6% of these admissions during 2008–2012. Infectious and respiratory diseases collectively were responsible for the majority of admissions. Falls were the leading reasons for injury admissions with a social gradient. • During 2006–2010, SUDI was the leading cause of mortality with a social gradient in post-neonatal infants. Pneumonia was the leading cause of deaths from medical conditions, while vehicle occupant injuries were the leading cause of injury deaths. • Medical admissions in infants increased during the early 2000s, reached a peak in 2002, and then declined. An upswing was again evident during 2007–2012. In contrast, injury admissions with a social gradient declined during the early 2000s, but were relatively static during 2004–2012. Note: The exclusion of Emergency Department cases from injury admissions may again have been partly responsible for these diverging trends. • Hospitalisations for medical conditions were higher for Pacific > Māori > European/Other > Asian/Indian infants. While trends varied by ethnic group in the early to mid 2000s, rates for all four ethnic groups increased between 2007 and 2012. • Injury admissions were higher for Pacific, Māori and European/Other infants than for Asian/Indian infants. Large year to year variations (possibly as a result of small numbers), however, made trends by ethnicity difficult to interpret. • Social gradients for hospitalisations for medical conditions in infants (as assessed by ethnicity and NZDep06) varied by condition, with the excess risk ranging from around 1.3 times higher to 6.4 times higher for those living in the most deprived (NZDep06 deciles 9–10) areas, depending on the condition under review.
Infant Mortality and Sudden Unexpected Death in Infancy (SUDI)	• During 2006–2010, extreme prematurity and congenital anomalies were the leading causes of neonatal mortality, while SUDI was the leading cause of post neonatal mortality. • Neonatal mortality was higher for Pacific and Māori infants than for European/Other and Asian/Indian infants, for males and those from average to more deprived (NZDep deciles 3–10) areas. Post neonatal mortality was higher for Māori and Pacific > European/Other > Asian/Indian infants, males and those from more deprived (NZDep deciles 7–10) areas. • SUDI rates declined during the early 2000s, were static during the mid-2000s, and then declined again in 2010. When broken down by sub-type, deaths attributed to SIDS continued to decline throughout 2000–2010, while deaths due to suffocation/strangulation in bed became more prominent as the period progressed. It is unclear whether this reflected a change in SUDI coding, or whether the sleeping environment made an increasingly greater contribution over time. • SUDI mortality was highest in infants aged 4–7 weeks, followed by those 8–11 weeks and then those 0–3 weeks of age. Suffocation/strangulation in bed accounted for 44.7% of all SUDI deaths in those less than 16 weeks of age. • SUDI rates were higher for Māori and Pacific infants than for European/Other or Asian/Indian infants and those from more deprived (NZDep deciles 7–10) areas.

Indicator	New Zealand Distribution and Trends
Injuries Arising from the Assault, Neglect and Maltreatment of Children Aged 0–14 Years	• During 2000–2012, inpatient admissions for injuries arising from the assault, neglect or maltreatment of children 0–14 years declined, while mortality during 2000–2010 was relatively static. On average during 2000–2010, eight children per year died as a result of injuries arising from assault, neglect or maltreatment. • During 2008–2012, inpatient admissions exhibited a U-shaped distribution with age, with rates being higher for infants aged <1 year and those over eleven years of age. In contrast, mortality was highest for infants <1 year, followed by pre-school aged children. While the gender balance was relatively even during early childhood, hospitalisations for males became more prominent as adolescence approached. • During 2000–2012, admissions were higher for Māori and Pacific children than for European/Other and Asian/Indian children. While rates for Māori children increased during the early to mid-2000s, they declined during 2010–2012. Rates for European/Other children declined during the early to mid 2000s, but increased slightly during 2010–2012, while rates for Asian/Indian children exhibited a general downward trend. Trends for Pacific children were more variable. • During 2008–2012, traumatic subdural haemorrhages and superficial head injuries were the most common injuries sustained in children aged 0–4 years, while head, upper limb and abdominal/lower back/pelvic injuries predominated in children aged 5–12 years.
The Assault, Neglect and Maltreatment of Children Aged 0–4 Years	• During 2000–2012, inpatient admissions for injuries arising from assault, neglect or maltreatment in children aged 0–4 years fluctuated, while assault related injuries managed in the Emergency Department (ED), and those with a primary diagnosis outside of the traditional ICD-10 injury range gradually increased. Overall, assault, neglect or maltreatment admissions were static during the early 2000s, but increased during 2004–2011, and then declined slightly in 2012. • During 2008–2012, the most severe injuries were seen in children aged 0–4 years who were admitted as inpatients, with 22.7% of inpatient admissions for assault related injuries being for traumatic subdural haemorrhages, and a further 4.8% being for fractures of the skull or facial bones. Of children with injuries managed in the ED, 21.8% had a superficial head injury, with a further 9.1% receiving a concussion. Of those with a primary diagnosis outside the injury range, 52.8% were admitted for “observation”, with this often relating to an injury or accident. A range of respiratory and infectious diseases also contributed to this category. • Inpatient injury admissions, and those with a primary diagnosis outside the injury range, were highest in infants <1 year, with rates then tapering off with age. Those with injuries managed in ED were more evenly distributed across the first five years. • Overall admissions for assault, neglect or maltreatment (all categories combined) were higher for Māori and Pacific children than for European/Other and Asian/Indian children. While large year to year variations made trends difficult to interpret for most ethnic groups, for Māori children rates increased between 2002–03 and 2008–09, and then decreased during 2010–2012.

CHILD POVERTY AND ECONOMIC INDICATORS



CHILD POVERTY AND LIVING STANDARDS

MEASURING CHILD POVERTY: INTRODUCTION

In its Report on Solutions to Child Poverty, the Office of the Children's Commissioner's Expert Advisory Group (EAG) on Solutions to Child Poverty adopted the following definition:

"Children living in poverty are those who experience deprivation of the material resources and income that is required for them to develop and thrive, leaving such children unable to enjoy their rights, achieve their full potential and participate as equal members of New Zealand society" OCC EAG on Solutions to Child Poverty 2012 [3].

This definition encompasses the two approaches to child poverty measurement most commonly used in New Zealand to date, with material deprivation or hardship referring to a family's living standards and the degree to which a family must forgo key consumables (e.g. fruit and vegetables, shoes and clothing, heating) in order to make ends meet [4].

In contrast, income measures are based on a family's disposable income (i.e. market income, less income tax, plus social assistance, including Working for Families tax credits) adjusted for family size and composition. Income poverty thresholds are traditionally set as a proportion of the national median household income, for example at 60% of the median household equivalent disposable income, after adjusting for housing costs. Median income refers to the middle of all incomes in New Zealand, where half the number of households have income below that, and half have incomes above [3] [4].

This report includes two types of income poverty threshold. First, the standard relative income poverty measure compares incomes to 60% of the median in the current year. This measure is usually referred to as a relative, moving-line or relative-to-contemporary median measure. The second income measure included compares current incomes to 60% of the median income in a particular reference year (e.g. 2007). This is often referred to as a fixed line measure [3] [4].

Each group of measures captures a slightly different facet of economic wellbeing, as a family's overall economic position is determined by its ability to access the resources it requires, in relation to its needs. In this context, current income, even if measured accurately and adjusted for household size and composition, is only one part of the equation, with other resources (e.g. savings, accumulated assets, access to cash in kind and extended family and community networks) also needing to be taken into account. Similarly, families may have differing demands placed on their incomes including the servicing of pre-existing debts, health and disability costs, transport costs and the expectations of extended family members and community networks [2].

In recognition of this fact, in its report on Solutions to Child Poverty, the EAG [3] recommended that the Government monitor at least five different poverty measures:

1. A Fixed-Line Income Poverty Measure
2. A Moving-Line Income Poverty Measure
3. A Material Deprivation Measure
4. A Severe Poverty Measure
5. A Measure of Poverty Persistence

These five measures were selected because the EAG [3] believed it was important not only to assess families' incomes, but also their day to day living standards. In addition, measures of poverty severity and persistence were seen as being important, as the impact of poverty on child outcomes was thought to be greater when child poverty was severe, or persisted over long periods of time.

The following sections review the data currently available in the New Zealand for each of these measures of child poverty.

CHILD POVERTY: INCOME BASED MEASURES

Introduction

High rates of child poverty are a cause for concern, as low family income has been associated with a range of negative health, education, justice, labour market and social outcomes [5]. Negative health outcomes include low birth weight, infant mortality, poorer mental health and cognitive development, and hospital admissions from a variety of causes [6]. Research suggests that exposure to low family income during childhood and early adolescence may also increase the risk of leaving school without qualifications, economic inactivity, early parenthood and contact with the justice system. While adjusting for potentially confounding factors (e.g. parental education, maternal age, and sole parent status) reduces the magnitude of these associations somewhat, they do not disappear completely. This suggests that the pathways linking low family income to long term outcomes are complex, and in part may be influenced by other socioeconomic factors [7].

In New Zealand, the Ministry of Social Development uses a range of income based measures to monitor child poverty. All are based on a family's disposable income (i.e. market income, less tax, plus social assistance) adjusted for family size and composition. An income poverty threshold commonly used is a household equivalent disposable income of less than 60% of the median, after adjusting for housing costs. We include both standard measures (based on current median income) as well as fixed-line measures which compare incomes to the median at a fixed point in time (e.g. 2007) [2].

The following section uses information from the NZ Household Economic Survey (NZHES) to review the proportion of children aged 0–17 years living in households with incomes below the 60% income poverty threshold (after tax, and adjusting for family size and composition) [2]. Because housing costs tend to be set over the short term and can consume a significant amount of families income, using an after housing cost (AHC) measure provides a good picture of the level of resources available to families for other necessary spending.

Data Source and Methods

Definition

1. *Proportion of dependent children aged 0–17 years living below the 60% income poverty threshold before housing costs (BHC)*

2. Proportion of dependent children aged 0–17 years living below the 60% income poverty threshold after housing costs (AHC)

Data Source

New Zealand Household Economic Survey (NZHES n=2,800–3,500 households per survey) via Perry 2013 [2]. Note: Child Poverty measures are reported on by the Ministry of Social Development using NZHES data [2] which they report on 2-yearly from 1982–1998, and 3-yearly thereafter. Since 2007, income data have been reported on annually through the new HES Incomes Survey. The full NZHES (including expenditure data) however remains 3-yearly. For more detail on methodology see Perry 2013 [2] and Perry 2014 [1].

Note: In February 2014, Treasury and Statistics NZ advised that there had been an error in the calculation of household incomes, which impacted on child poverty rates for 2010–2012 [1]. The figures presented here, which have been revised to include the corrected data, may differ from those presented in previous NZCYES reports.

Interpretation

Note 1: Standard (or relative) poverty measures set a poverty benchmark that rises and falls with changes in national median incomes (i.e. poverty is defined in relation to the incomes of others in the same year). Fixed-line poverty measures select a poverty benchmark at a set point in time (e.g. 1998 or 2007) and then adjust forward and back in time for changes in consumer prices (i.e. they seek to maintain a constant buying power for the poverty benchmark over time). In his 2013 update, Perry [2] notes that in real terms, the median income in 1998 was similar to 1982 and thus there is a good case for using 1998 as the reference year for fixed-line poverty calculations back to 1982, as well as forward from 1998. By 2007 however, the median was 16% higher than in 1998 and by 2009 26% higher, hence the reference year was changed to 2007.

Note 2: While reporting fixed-line poverty figures back to 1982 using 2007 as the reference tells us what proportion was 'poor' back then relative to 2007, this approach is not useful for assessing the extent of hardship 'back then' relative to the standards of the day. Thus in the analyses which follow, 2007 fixed-line figures are provided from 2007 onwards, with earlier years using 1998 as the reference year. The first two figures however, report 1998 and 2007 fixed-line figures for the entire period, in order to demonstrate the impact the change of reference year has on the poverty rates produced.

Note 3: Most income poverty measures use equivalised disposable household income (i.e. after tax household income adjusted for family size and composition). Both measures can be calculated before or after taking housing costs into account.

Note 4: Child poverty measures traditionally compare a household's income to the national median rather than the mean. The median is calculated by assigning individuals the income of their household, ranking them from those with the lowest to the highest income, and then finding the middle point of the income distribution. In contrast, the mean income is the average of the total population.

Mean incomes are usually higher than median incomes because the relatively few households with incomes at the very upper ranges of the income distribution often have a disproportionately large upward impact on the mean compared with the median. The varying number of very high income households in different years can also lead to the mean being less stable than the median. For more detail see Perry 2013 [2].

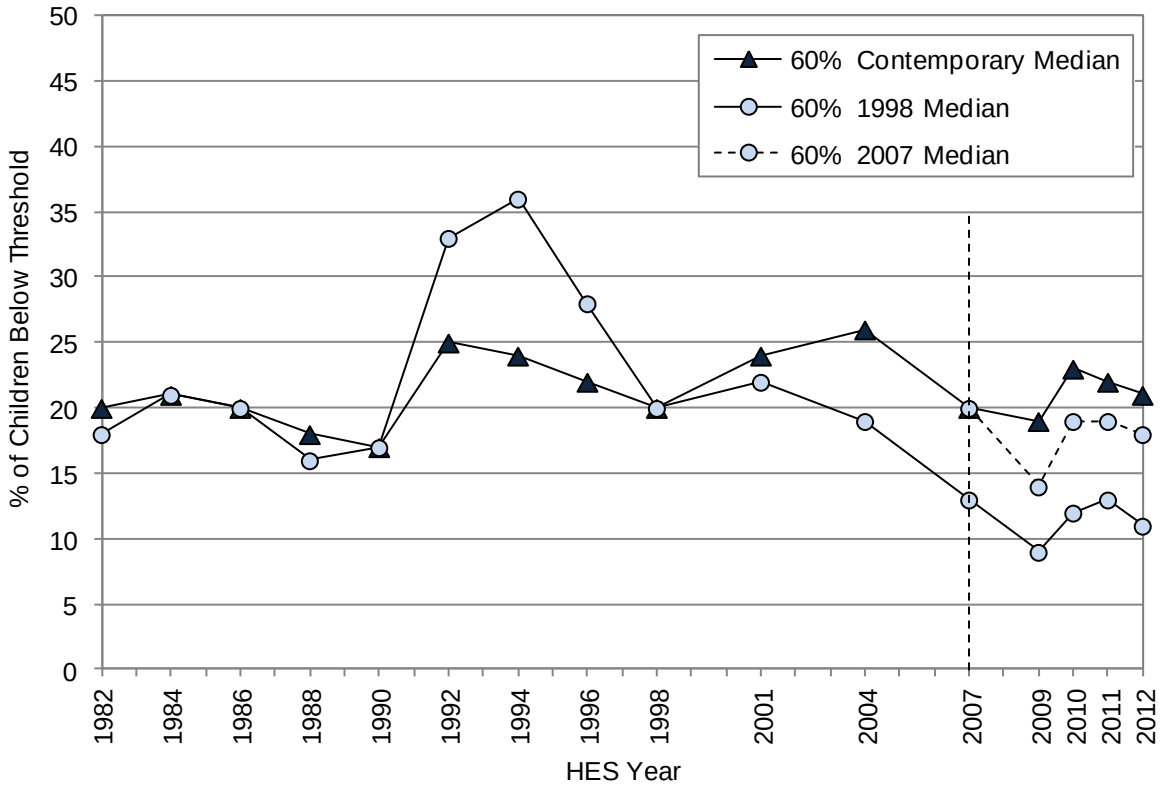
Child Poverty Trends Using Different Poverty Measures

Before Housing Costs (BHC)

Relative Poverty (<60% Contemporary Median): In New Zealand, child poverty rose rapidly during 1990–1992, with Perry [2] attributing this to rising unemployment and the 1991 Benefit cuts. The Benefit cuts disproportionately reduced incomes for beneficiaries. During 1992–1998, child poverty then declined, as a result of falling unemployment and the incomes of those around the poverty line rising more quickly than the median. After 1998 however, as economic conditions improved, median incomes again rose, while incomes for many low-income households with children did not, resulting in a rise in child poverty up until 2004. From 2004 to 2007 poverty rates again declined as a result of the Working for Families package [2]. Between 2009 and 2010, however, there was an increase in child poverty, with rates then declining again during 2010–2012 (**Figure 1**).

Fixed Line Poverty (<60% 1998 and 2007 Median): In New Zealand during the early 1990s, fixed line child poverty measures increased markedly, for similar reasons to those outlined above. During 1994–1998 however, child poverty rates declined, a trend which Perry attributes to improving economic conditions and falling unemployment. Rates fell more rapidly during 2004–2007 as a result of the Working for Families package [2]. As with the relative measure, there was an increase in child poverty between 2009 and 2010, with rates then tapering off slightly during 2010–2012 (**Figure 1**).

Figure 1. Proportion of Dependent Children Aged 0–17 Years Living Below the 60% Income Poverty Threshold Before Housing Costs, New Zealand 1982–2012 HES Years



Source: Perry 2014 [1] derived from Statistics NZ Household Economic Survey (HES) 1982–2012

After Housing Costs (AHC)

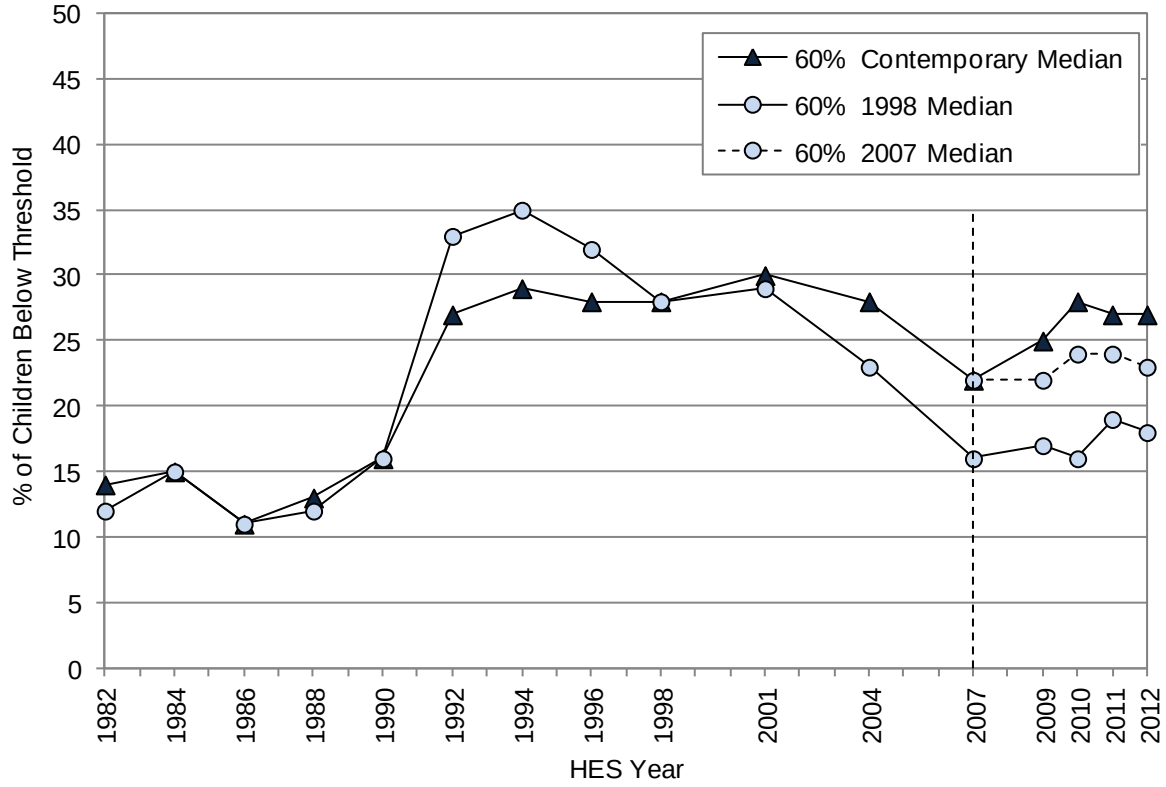
Relative Poverty (<60% Contemporary Median): In New Zealand during 1982–2012, while trends in relative child poverty after adjustment for housing costs (AHC) were broadly similar to before housing cost measures (BHC), AHC child poverty rates in 2012 were higher than in the 1980s, while BHC measures were lower than their early to mid-1980s levels. Perry [2] attributes these differences to the fact that housing costs in 2012 accounted for a higher proportion of household expenditure for low-income households than they did in the 1980s (in 1988 17% of households in the lowest income quintile spent more than 30% of their income on housing; in 2007 this figure was 39%). Perry notes however that the income-related rental policies introduced in 2000, along with later changes to Accommodation Supplements, helped reduce housing expenditure for some low income households and that these changes contributed to reductions in AHC child poverty during 2001–2007. There were no further policy changes during 2007–2012 however, with maximum rates of assistance remaining fixed, as housing costs continued to increase [2]. This resulted in increases in AHC child poverty rates during 2007–2010, with rates remaining relatively static thereafter (**Figure 2**).

Fixed Line Poverty (<60% 1998 and 2007 Median): In New Zealand during 1984–2008, trends in fixed line child poverty, after adjustment for housing costs, were broadly similar to before housing cost measures, with the fixed line (1998 AHC) poverty rate in 2007 being just a little higher it was in the 1980s (in contrast to the relative AHC poverty rate which was much higher than it was in the 1980s (**Figure 2**)).

Poverty by Age

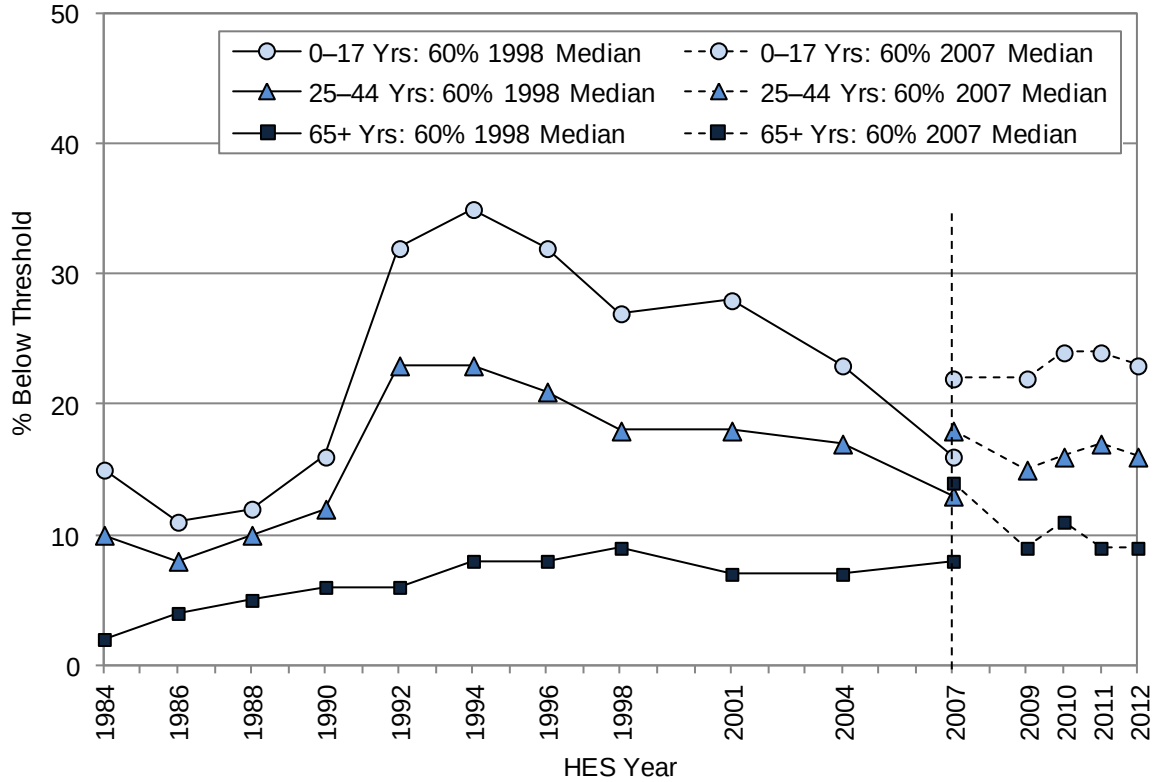
In New Zealand during 1984–2012, poverty rates were consistently higher for children aged 0–17 years, than for adults aged 25–44 years, with the lowest poverty rates being seen amongst those aged 65+ years (**Figure 3**). Thus in 2012, children aged 0–17 years were 2.6 times more likely to be in poverty than those aged 65+ years.

Figure 2. Proportion of Dependent Children Aged 0–17 Years Living Below the 60% Income Poverty Threshold After Housing Costs, New Zealand 1982–2012 HES Years



Source: Perry 2014 [1] derived from Statistics NZ Household Economic Survey (HES) 1982–2012

Figure 3. Proportion of Population Living Below the 60% Income Poverty Threshold After Housing Costs by (Selected) Age Group, New Zealand 1984–2012 HES Years



Source: Perry 2014 [1] derived from Statistics NZ Household Economic Survey (HES) 1984–2012

The Numbers of Children Living in Poverty in New Zealand

Table 2 shows the number and proportion of New Zealand children living below selected poverty thresholds from 2001–2012.

Table 2. Number and Proportion of Dependent Children Aged 0–17 Years Living Below Various Poverty Thresholds, New Zealand 2001–2012 HES Selected Years

HES Year	Before Housing Costs		After Housing Costs					
	<60% Contemporary Median		<50% Contemporary Median		<60% Contemporary Median		<60% 2007 Median	
	Number	% of children	Number	% of children	Number	% of children	Number	% of children
2001	250,000	24	215,000	21	310,000	30	380,000	37
2004	270,000	26	200,000	19	290,000	28	320,000	31
2007	210,000	20	170,000	16	240,000	22	240,000	22
2009	210,000	19	195,000	18	270,000	25	230,000	22
2010	245,000	23	200,000	19	300,000	28	260,000	24
2011	230,000	22	210,000	20	285,000	27	255,000	24
2012	220,000	21	205,000	20	285,000	27	240,000	23

Source: Perry 2014 [1] derived from Statistics NZ Household Economic Survey (HES) 2001–2012

Child Poverty by Demographic Factors

Child Poverty by Ethnicity

In the NZHES [2] only limited analyses by ethnic group are reported because of the relatively small sample sizes for Māori, Pacific and Other ethnic groups. While no time series data are available, poverty rates for Pacific and Māori children are consistently higher than for European children [2]. For example, on average over 2010 to 2012, using the AHC 60% fixed line measure, around 34% of Māori children and 34% of Pacific children lived in poor households, as compared to 17% of European children. The higher poverty rates seen in Māori children potentially reflect the relatively high proportion of Māori children living in sole parent beneficiary households (during 2007 to 2011, around 43% of DPB recipients were Māori). On average during 2010 to 2012, half (50%) of children living in poverty were Māori or Pacific, using the AHC 60% fixed line measure [1].

Other Demographic Factors

Technical Note: In February 2014, Treasury and Statistics NZ advised that there had been an error in the calculation of household incomes, which impacted on child poverty rates for 2010–2012 [1]. At the time of writing, revised data was not available for the figures presented below, and these figures only contain data up until 2009. These graphs will be updated as soon as corrected data becomes available.

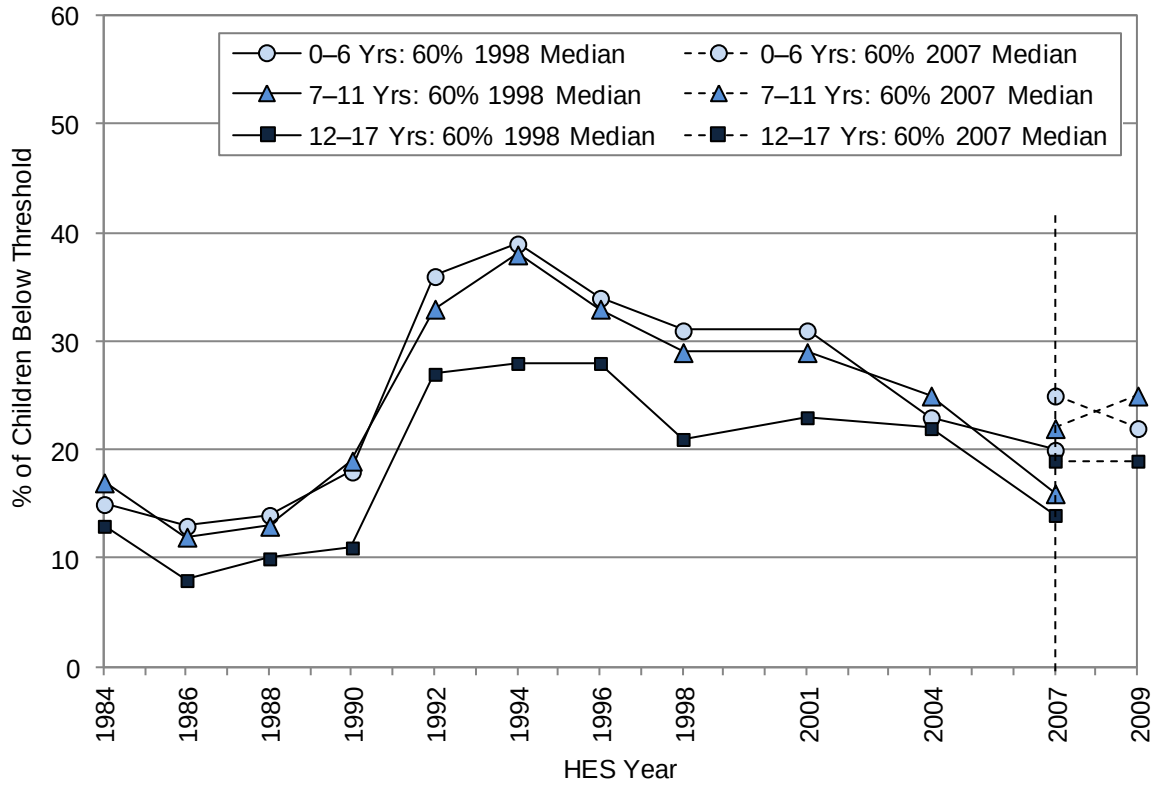
Child Poverty by Children's Age

In New Zealand during 1984–2009, poverty rates for younger children (0–6 years and 7–11 years) were generally higher than for older children (12–17 years) (**Figure 4**).

Child Poverty by Number of Children in Household

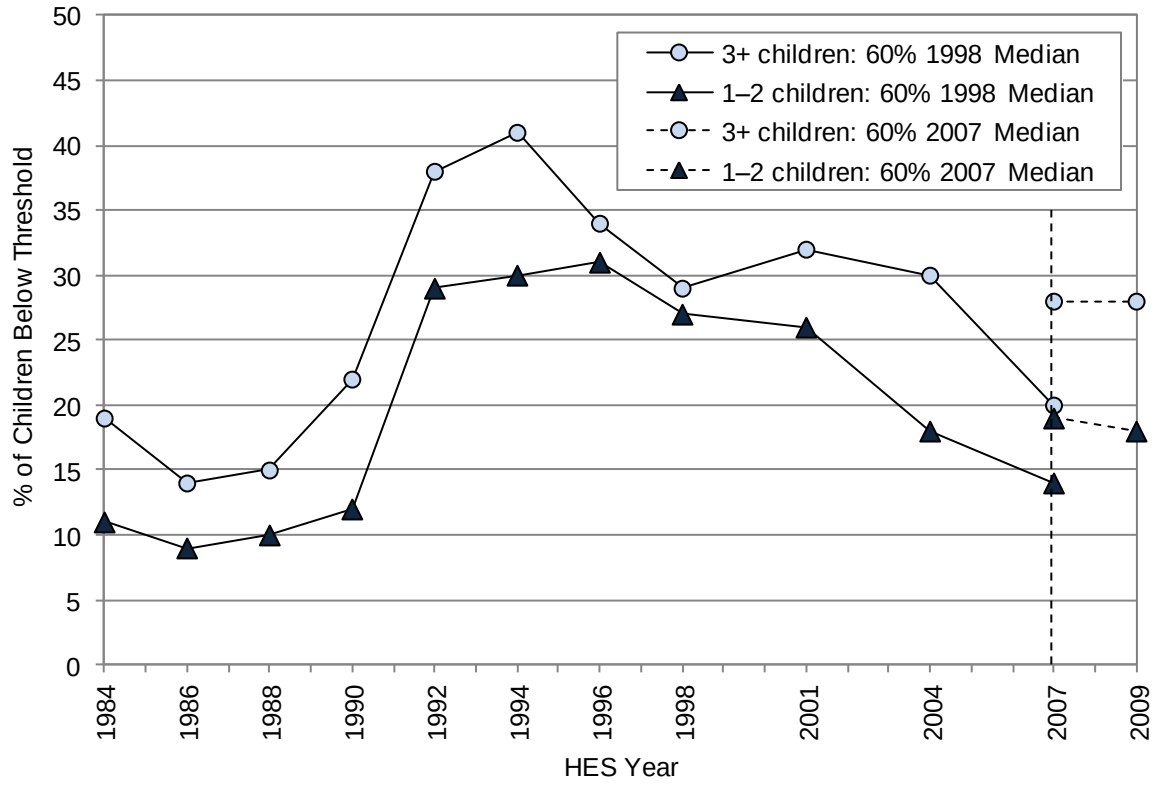
In New Zealand during 1984–2009, child poverty rates for households with three or more children were consistently higher than for those with one or two children (**Figure 5**).

Figure 4. Proportion of Dependent Children Living Below the 60% Income Poverty Threshold After Housing Costs by Age, New Zealand 1984–2009 HES Years



Source: Perry 2013 [2] derived from Statistics NZ Household Economic Survey (HES) 1984–2009

Figure 5. Proportion of Dependent Children Aged 0–17 Years Living Below the 60% Income Poverty Threshold After Housing Costs, by Number of Children in Household, New Zealand 1984–2009 HES Years



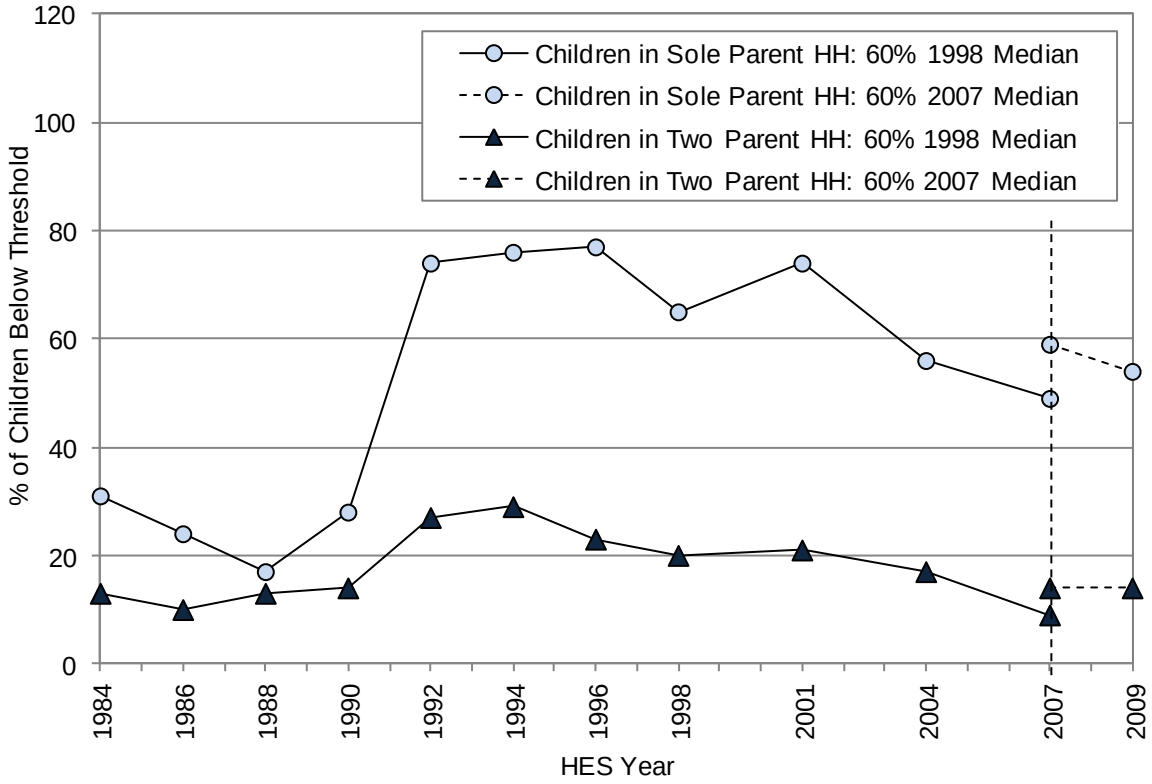
Source: Perry 2013 [2] derived from Statistics NZ Household Economic Survey (HES) 1984–2009

Child Poverty Trends by Household Type

In New Zealand, child poverty rates for children in both sole-parent and two-parent households increased rapidly between 1988 and 1992. In absolute terms, however, rates rose most rapidly for children in sole-parent households (rates peaked at 77% for sole-parent households in 1996 and at 29% for two-parent households in 1994). While rates for both household types declined between 2001 and 2007, during 2007 rates for those in sole-parent households remained higher than their 1980s levels, while rates for two-parent households were similar (**Figure 6**). Despite this, during 2010–2012, 53% of children in poverty were in sole parent households and 47% were in two-parent households [1].

Perry notes, however, that although poverty rates for children in sole parent families are much higher than for children in two parent families, around one in three solo parent families live in wider households with other adults. Children living in these "other" households have significantly lower poverty rates than those living in sole parent households, because of the greater household resources available [2].

Figure 6. Proportion of Dependent Children Aged 0–17 Years Living Below the 60% Income Poverty Threshold After Housing Costs by Household Type, New Zealand 1984–2009 HES Years



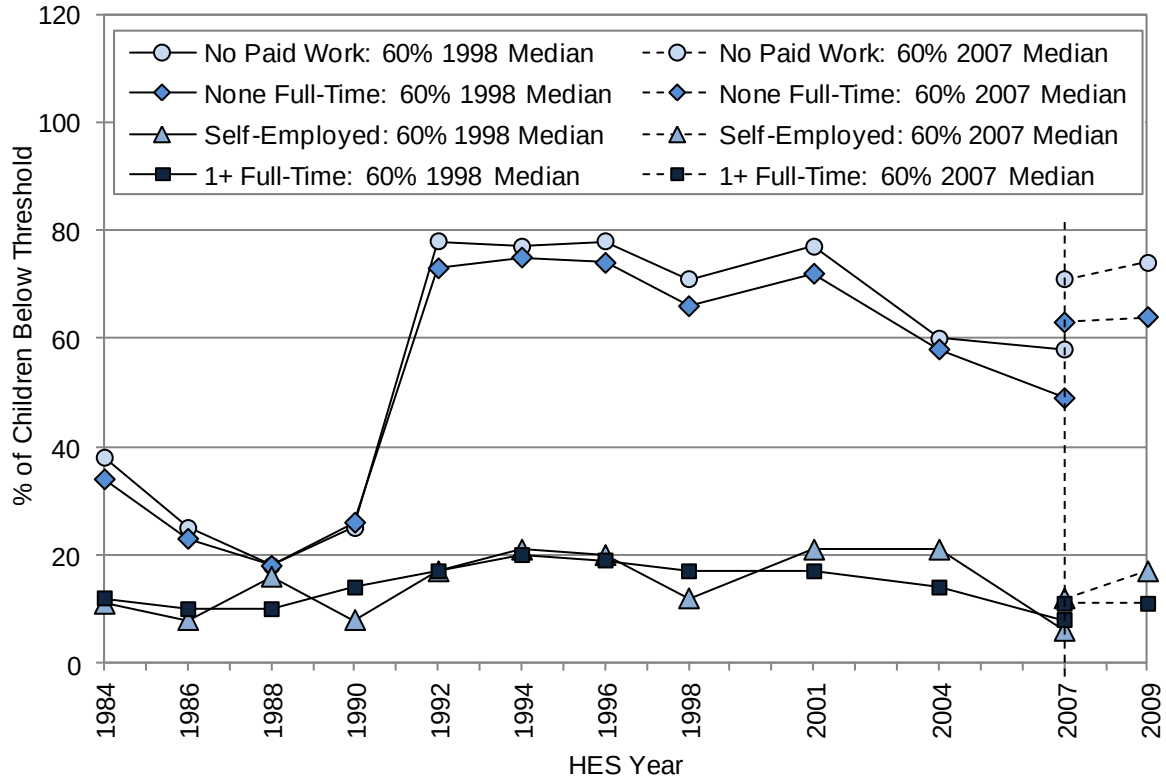
Source: Perry 2013 [2] derived from Statistics NZ Household Economic Survey (HES) 1984–2009

Child Poverty Trends by Work Status of Adults in Household

In New Zealand, child poverty rates for children in households with no adults in paid work, or where no adults worked full-time, increased rapidly during 1988–1992. Poverty rates for children in these households remained elevated during the 1990s (range 66%–78%), before declining during 2001–2007. Even at their lowest point in 2007, poverty rates for children in these households remained much higher than 1980s levels. In contrast, increases in child poverty for households where an adult worked full-time, or was self-employed, were much less marked, with rates in 2007–2009 being similar to those in the 1980s (**Figure 7**).

Perry notes that from 1992 to 2004, children in households with no adults in paid work generally had poverty rates around four times higher than for those in households where at least one adult worked full-time. From 2007 to 2012, the difference was even greater — around six to seven times higher for children in households where no adults were in paid work [2]. Despite this, during 2010–2012, 37% of children in poverty were in families relying on paid employment, while 63% were in families reliant on a benefit income [1].

Figure 7. Proportion of Dependent Children Aged 0–17 Years Living Below the 60% Income Poverty Threshold After Housing Costs, by Work Status of Adults in the Household, New Zealand 1984–2009 HES Years



Source: Perry 2013 [2] derived from Statistics NZ Household Economic Survey (HES) 1984–2009

CHILD POVERTY: MATERIAL HARDSHIP

In addition to income poverty, the Ministry of Social Development (MSD) uses a range of non-income measures to assess the material wellbeing of families with children. Such non-income measures reflect families' actual living standards, including their ability to keep the house warm in winter, to afford meat and fresh fruit and vegetables, to replace worn out shoes, clothing, and broken appliances, and to visit the doctor when required [2]. In monitoring these measures, the MSD uses data from two sources:

1. **The Living Standards Surveys**: The MSD has undertaken three national Living Standards Surveys, in 2000, 2004 and 2008. The 2008 Survey collected information from 5,000 households on their material circumstances, including ownership and quality of household durables, their ability to keep the house warm, pay the bills, have broken down appliances repaired, and pursue hobbies and other interests [8].
2. **The New Zealand Household Economic Survey (NZHES):** The MSD has developed a 40-item Economic Living Standards Index (ELSI) which ranks households from low to high living standards using a range of non-income measures. A short (25 item) form of the ELSI has been included in the NZHES since 2006–07 [2].

The Living Standards Survey produces rich data, including child-specific measures. Unfortunately, it was last run in 2008. The NZHES still provides indexing of material hardship and is available annually. The following section briefly reviews the proportion of children 0–17 years experiencing material hardship using information from the 2008 Living Standards Survey, before considering children's exposure to hardship using NZHES data.

2008 Living Standards Survey

Data Source and Methods

Definition

Proportion of Children Aged 0–17 Years Experiencing Material Hardship

In the 2008 Living Standards Survey [8], respondents provided information about themselves and others in their Economic Family Unit (EFU). A respondent's EFU comprised the respondent and partner (if any), together with their dependent children in the household (if any). This was a narrower concept than the census family unit which includes other family members such as adult children and parents of adult children. In the survey, total response ethnicity was used, meaning that categories were not mutually exclusive, as one person could be in two or more categories depending on their response.

Deprivation Index Based on Data from the 2008 Living Standards Survey

In the 2008 Living Standards Survey report [8], a 14 item material deprivation index was used to compare the relative positions of different population groups. Each item in the index assessed an 'enforced lack', with items being divided into two categories: ownership/participation, where an item was wanted but not possessed because of cost; and economising items, which focused on cutting back or going without in order to pay for other basic needs. The deprivation score for each respondent was the sum of all enforced lacks, with a cut off of 4+ being used as a measure of material hardship, as it represented the 15% of the population experiencing the most hardship (and was thus seen as being equivalent to the MSD's income poverty measures).

14 Items (enforced lacks) are included in 2008 Living Standards Survey Deprivation Index

Ownership/Participation

- A good bed
- Ability to keep main rooms adequately warm
- Suitable clothes for important or special occasions
- Home contents insurance
- Presents for family and friends on special occasions

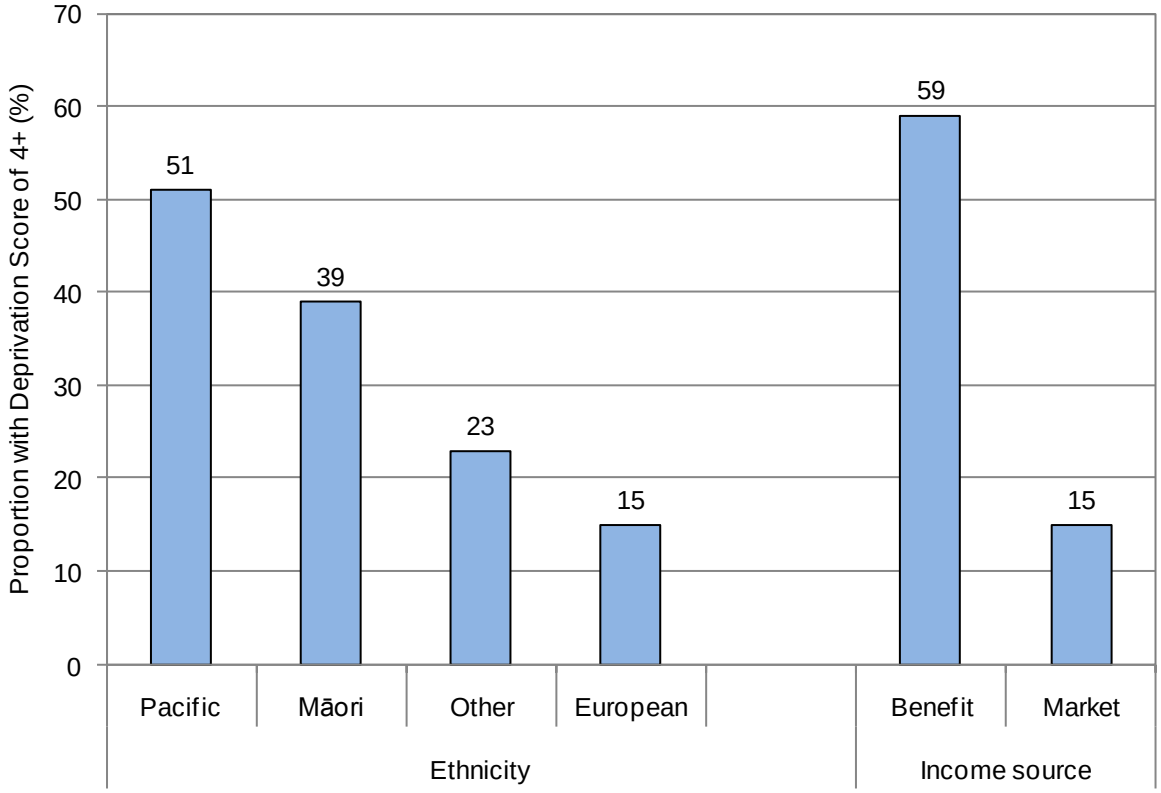
Economising 'a lot' (to keep down costs to help pay for other basics)

- Continued wearing worn out clothing
- Continued wearing worn out shoes
- Went without or cut back on fresh fruit and vegetables
- Bought cheaper or less meat than wanted
- Postponed visits to the doctor
- Did not pick up a prescription
- Put up with feeling cold to save on heating costs
- Went without or cut back on visits to family or friends
- Did not go to a funeral (tangi) you wanted to

Proportion of Children Experiencing Material Hardship

In the 2008 Living Standards Survey, 51% of Pacific children, 39% of Māori children, 23% of "Other" children and 15% of European children aged 0–17 years were in families experiencing material hardship (i.e. scored four or more on a composite deprivation index measuring a range of "enforced lacks", as outlined in the Methods box above). In addition, 59% of children whose family's income source was a benefit experienced material hardship (**Figure 8**).

Figure 8. Proportion of Children Aged 0–17 Years Experiencing Material Hardship* by Ethnicity and Family Income Source, NZ Living Standards Survey 2008



Source: NZ 2008 Living Standards Survey [8]. *Material Hardship defined as scoring four or more on a composite deprivation index measuring a range of "enforced lacks", as outlined in the Methods box; Ethnicity is Total Response

Table 3 provides an overview of the distribution of children by their family's deprivation scores (DEP). It suggests that 22% of children lived in families experiencing four or more enforced lacks (10% had a DEP Score of 4–5 and 12% a DEP score of 6+).

When broken down by individual item, those children experiencing material hardship (i.e. living in households with DEP scores of four or more) had much higher exposures to household economising behaviours such as having to wear worn out shoes or clothing, sharing a bed or bedroom, cutting back on fresh fruit and vegetables and postponing doctor's visits because of cost. For example, 39% of children whose families had a DEP score of 6+ continued to wear worn out shoes or clothing, while 58% had major difficulty keeping the house warm in winter (**Table 3**).

Table 3. Restrictions Experienced by Children, by the Deprivation Score of their Family, NZ Living Standards Survey 2008

	Percentage (%)					
	All	0	1	2–3	4–5	6+
Distribution of children across the DEP scores	**100**	**41**	**18**	**18**	**10**	**12**
Average number of children per family		2.2	2.3	2.5	2.7	2.7
Enforced lacks of children's items						
Friends to birthday party	6	-	-	5	9	31
Waterproof coat	8	-	2	8	11	39
Separate bed	5	-	-	3	13	20
Separate bedrooms for children of opposite sex (10+ yr)	8	2	3	6	14	24
All school uniform items required by the school	5	-	-	2	9	19
Economising 'a lot' on children's items to keep down costs to afford other basics						
Children continued to wear worn out shoes/clothes	8	-	-	5	15	39
Postponed child's visit to doctor	2	-	-	-	5	13
Did not pick up prescription for children	1	-	-	-	3	7
Unable to pay for school trip	3	-	-	-	6	17
Went without music, dance, kapa haka, art etc.	9	2	4	8	18	37
Involvement in sport had to be limited	8	-	4	6	17	32
Multiple deprivation						
4+ of the 11 children's items above	6	-	-	2	11	35
5+ of the 11 children's items above	4	-	-	-	7	29
6+ of the 11 children's items above	3	-	-	-	2	24
Children's serious health problems reported by respondent						
Serious health problems for child in the last year	28	22	25	31	35	43
Enforced lacks reported by respondent in child's family						
Keep main rooms warm	9	-	3	8	18	37
Meal with meat/chicken/fish at least each second day	3	-	-	-	6	18
Cut back/did without fresh fruit and vegetables	14	-	-	15	32	63
Postponed visit to doctor	14	-	4	18	38	65
One week’s holiday away from home in last year	33	14	28	42	52	73
Home computer	8	3	6	8	13	25
Internet access	9	-	7	9	18	28
Housing and local community conditions						
Physical condition of house (poor/very poor)	7	-	3	7	15	28
Major difficulty to keep house warm in winter	22	9	13	27	38	58
Dampness or mould (major problem)	17	5	13	18	37	49
Crime or vandalism in the area (major problem)	11	6	6	11	13	31

Source: NZ 2008 Living Standards Survey [8]; Note: Only those items mentioned in the Methods Box are included in the calculation of DEP Scores. This table includes a number of additional child specific items which were not included in the calculation of the DEP Index as they did not relate to all family types. These additional items have been included here in order to highlight the experiences of children living in households with differing experiences of material deprivation. This is why some of the percentages for individual items are >0 in the DEP 0 column i.e. a family may have scored 0 for the 14 items in the DEP Index, but did report an enforced lack for some of the other child specific measures.

New Zealand Household Economic Surveys

Data Source and Methods

Definition

Proportion of Children Aged 0–17 Years Experiencing Material Hardship

Data Source

New Zealand Household Economic Survey (n=2,800–3,500 households per survey) via Perry 2013 [2].

The MSD has developed a 40-item Economic Living Standards Index (ELSI) which ranks households from low to high living standards using a range of non-income measures. A short (25 item) form of the ELSI has been included in the NZHES since 2006–07, with 16 items (below) being used to calibrate a material hardship measure [2].

Enforced lack of essentials

- Meal with meat, fish or chicken (or vegetarian equivalent) at least each 2nd day
- Two pairs of shoes in good repair and suitable for everyday use
- Suitable clothes for important or special occasions
- A good bed

Economised, cut back or delayed purchases 'a lot' because money was needed for other essentials

- Fresh fruit and vegetables
- Meat
- Replacing worn out clothes
- Put up with being cold
- Visits to the doctor
- Trips to the shops or other local places
- Repair or replace broken or damaged appliances

In arrears more than once in last 12 months, because of shortage of cash at the time

- Rates, electricity, water
- Vehicle registration, insurance or Warrant of Fitness

Financial stress and vulnerability

- Had to borrow from friends or family more than once in last 12 months to cover everyday expenses
- Feel 'very limited' by the money available when thinking about purchase of clothes or shoes for self
- Could not pay an unexpected and unavoidable bill of $500 within a month without borrowing

In Perry's 2013 report [2], the ELSI hardship threshold was set at 6 or more deprivations out of 16 from the calibration list above. This gave a population hardship rate in 2008 of 12%, which was close to the 2008 income poverty rate (using the more stringent 50% of median AHC threshold) of 13%. For further detail on the methodology used see Perry 2013 [2].

Proportion Living in Material Hardship by Age

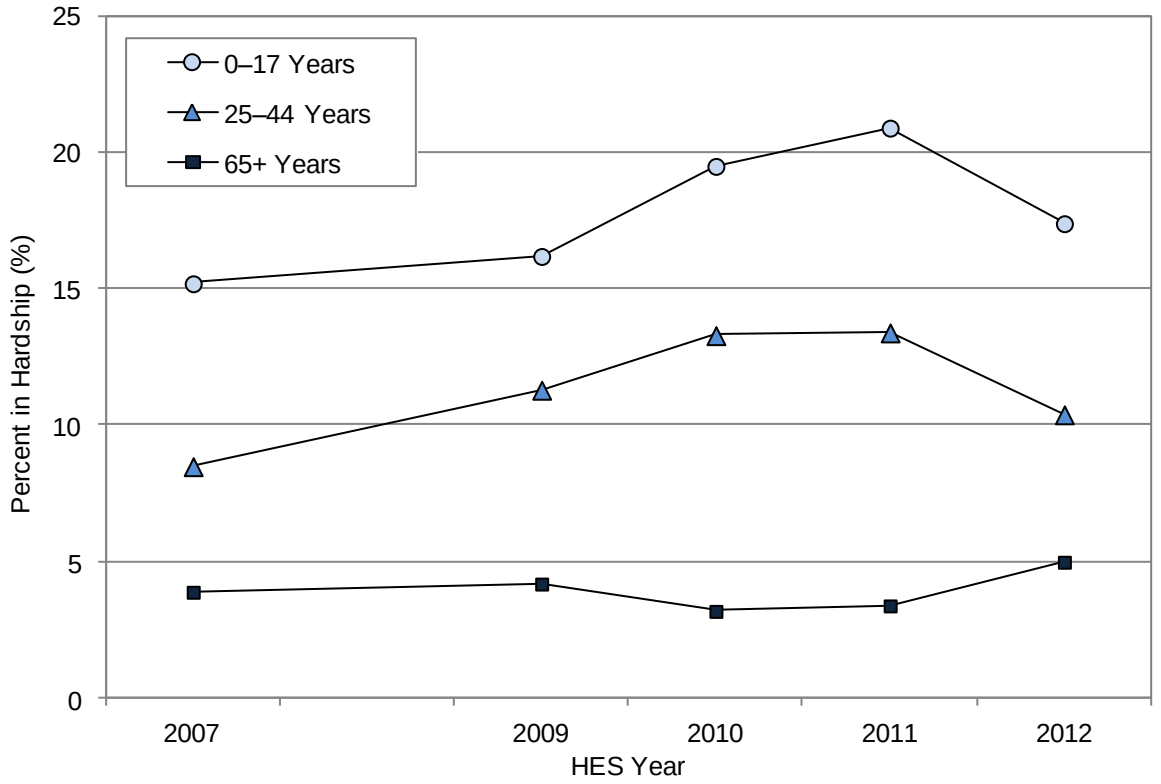
In New Zealand during 2007–2012, material hardship, as defined using the Economic Living Standards Index (ELSI), was consistently higher for children 0–17 years than for other age groups, with the lowest rates of hardship being seen those aged 65+ years. Material hardship in children 0–17 years rose from 16% in 2009 to 21% in 2011, before falling again, to 17% in 2012 (**Figure 9**). This is around 180,000 children living in material hardship in 2012.

In his 2013 report, Perry notes that the rise in material hardship from 2007 to 2011 for the total population and for children 0–17 years is not unexpected, given the impact of the Global Financial Crisis and economic downturn, with the improvements seen between 2011 and 2012 reflecting the early impacts of the more recent recovery [2].

Proportion Living in Material Hardship by Age and Household Type

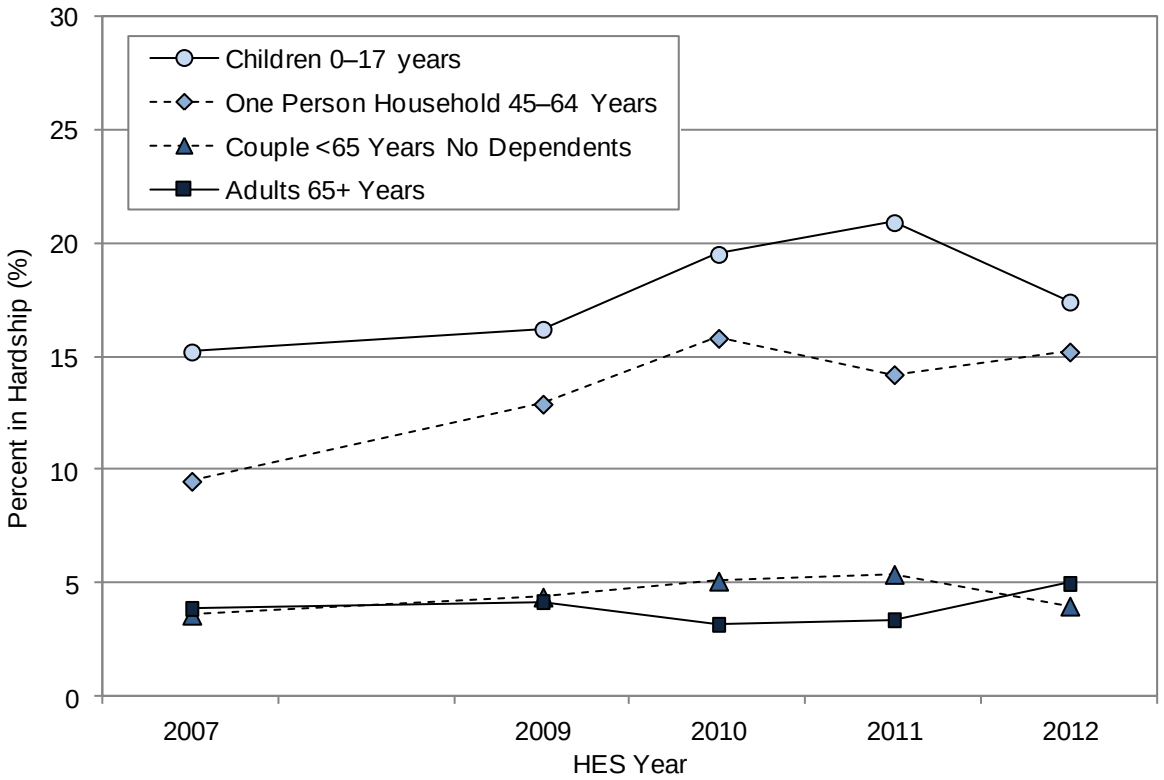
When broken down by age and household type, the proportion living in material hardship was highest for children 0–17 years, followed by single people (one person households) aged 45–64 years. Those with the lowest proportion living in material hardship were couples under 65 years with no dependents, and those aged 65+ years (**Figure 10**).

Figure 9. Proportion Living in Material Hardship by Selected Age Groups, New Zealand 2007–2012 HES Years



Source: Perry 2013 [2] derived from Statistics NZ Household Economic Survey (HES) 2007–2012; Hardship defined using Economic Living Standards Index (ELSI), see Methods for further detail.

Figure 10. Proportion Living in Material Hardship, Children 0–17 Years and Selected Sub-Groups, New Zealand 2007–2012 HES Years

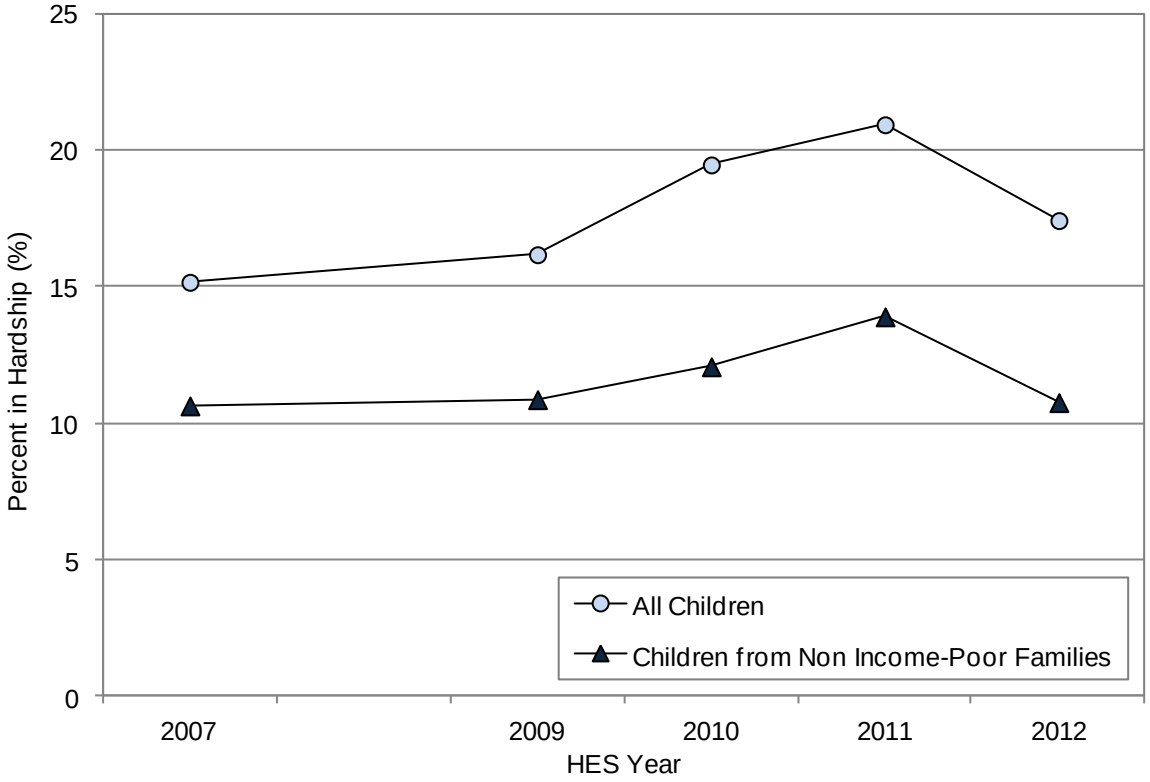


Source: Perry 2013 [2] derived from Statistics NZ Household Economic Survey (HES) 2007–2012; Hardship defined using Economic Living Standards Index (ELSI), see Methods for further detail.

Proportion of Children Living in Material Hardship by Family Income

During 2007–2012, a lower proportion of children from non income-poor families (i.e. those with a family income above the 60% poverty threshold) lived in material deprivation than did New Zealand children overall. However, material hardship rates for non income-poor families rose during 2009–2011 as they did for the total child population (**Figure 11**). In his 2013 report, Perry [2] contrasts the relatively static income-poverty rates for children 0–17 years between 2009–2011 with the increases seen in material hardship. He notes that one of the main reasons for these differing trends was that families with children with incomes above the 60% poverty threshold reported increasing hardship between 2009 and 2011. He thus suggests that a number of families with incomes above the 60% threshold may be in relatively precarious financial circumstances, with small drops in income or unexpected bills potentially making a significant difference to their day-to-day living standards [2].

Figure 11. Proportion of Children 0–17 Years Living in Material Hardship by Family Income Category, New Zealand 2007–2012 HES Years



Source: Perry 2013 [2] derived from Statistics NZ Household Economic Survey (HES) 2007–2012; Hardship defined using Economic Living Standards Index (ELSI), see Methods for further detail. Non income-poor families are those with an income above the 60% threshold.

CHILD POVERTY: SEVERITY AND PERSISTENCE

Research suggests that the timing, duration and severity of poverty during childhood all influence longer term outcomes, with those experiencing poverty early, or for prolonged periods, having worse outcomes than those exposed to poverty only during adolescence, or for shorter periods of time [9] [10]. Further, the duration of income poverty also influences the severity of material deprivation, with analysis of Statistics NZ's Survey of Family Income and Employment (SoFIE) data finding significant correlations between the length of time spent on a low income, and the resulting level of material deprivation [11].

As a result, in 2012 the Office of the Children's Commissioner's Expert Advisory Group on Child Poverty recommended that the Government monitor the severity and persistence of poverty for families with children [3]. Unfortunately, these two measures are much less developed than the headline income poverty and material deprivation measures for a variety of reasons. Firstly, while the Household Economic Survey (HES) provides useful cross sectional snapshots of poverty over time, it samples a different set of households each survey, and thus is unable to provide any information on how many households who were poor in one survey, are still poor in the next [2].

A number of measures are available to assess the depth and severity of poverty [2]:

- The ratio of the number below the 50% line to those below the 60% line (the higher the ratio, the greater the depth of poverty).
- Median poverty gap ratios that compare the gap between the poverty threshold and the median income of those below the threshold with the threshold itself.
- The total poverty gap that measures the total resources ($m) required to bring all those identified as poor to just above the poverty line via targeted tax transfers.

Unfortunately, these measures are not updated regularly, with Perry also expressing concerns about the quality of HES data for households with very low incomes, which may have a detrimental impact on the robustness of measures of poverty depth [2].

A further issue is that while a range of reasonably robust measures of poverty persistence are available, all are based on Statistics NZ's longitudinal Survey of Family, Income and Employment (SoFIE), which ran between 2002 and 2009 [2]. Unfortunately no further updates are planned beyond this point.

Given the significant influence poverty severity and persistence have on long term outcomes for children however, it is undesirable that these limitations should preclude the monitoring of poverty severity and duration. Thus in the absence of more robust measures or in the case of persistent poverty more up to date data, the following sections present two proxy indicators which each capture a different aspect of the severity and duration of child poverty in New Zealand.

Poverty Severity

- The proportion of children living in households below the 50% income poverty threshold, as measured using HES data [2].

Poverty Persistence

- The proportion of children exposed to chronic low income, as measured using data from Statistics New Zealand's Longitudinal Survey of Families, Income and Employment (SoFIE) up until 2009 [2,12]).

It is hoped that in time, these proxy indicators will be replaced by more robust measures, which better capture the severity and persistence of poverty for New Zealand children.

Poverty Severity

Data Source and Methods

Definition

Proportion of children aged 0–17 years living below the 50% income poverty threshold before and after housing costs

Data Source

New Zealand Household Economic Survey (NZHES n=2,800–3,500 households per survey) via Perry 2013 [2]. Note: Child Poverty measures are reported on by the Ministry of Social Development using NZHES data [2] with data being reported on 2-yearly from 1982–1998 and 3-yearly thereafter. Since 2007, income data have been reported on annually using the new HES Incomes Survey. The full NZHES (including expenditure data) however remains 3-yearly. For more detail on methodology see Perry 2013 [2].

Note: In February 2014, Treasury and Statistics NZ advised that there had been an error in the calculation of household incomes, which impacted on child poverty rates for 2010–2012 [1]. The figures presented here, which have been revised to include the corrected data, may differ from those presented in previous NZCYES reports.

Interpretation

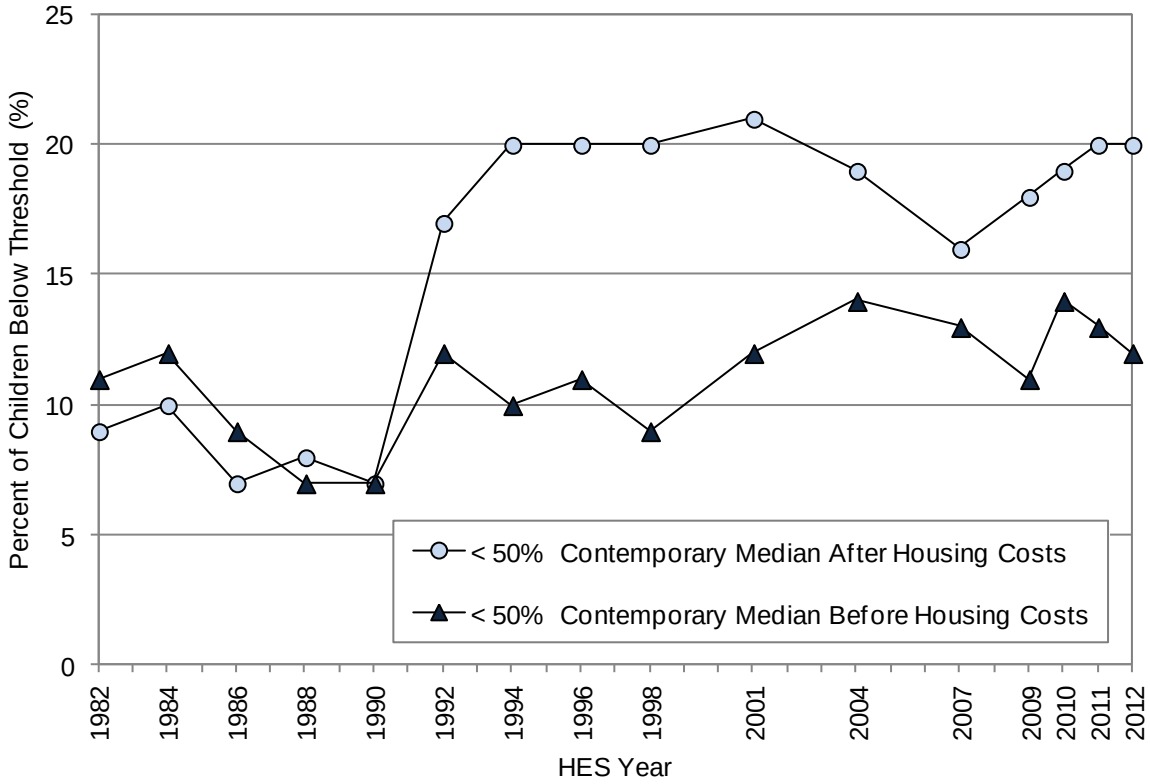
The <50% relative poverty measure is based on a poverty benchmark that rises and falls with changes in national median incomes (i.e. poverty is defined in relation to the incomes of others in the same year).

For further detail see the Methods box on **Page 35** or Perry 2013 [2].

Children in Households with Incomes <50% of Contemporary Median

In the absence of more robust measures, one approach to assessing the severity of child poverty is to select an income threshold lower than the traditional 60% cut-off. Where all else is the same, children in households with incomes below the 50% moving line threshold, will experience greater material disadvantage than those just below the 60% threshold.

Figure 12. Proportion of Dependent Children Aged 0–17 Years Living Below the 50% Income Poverty Threshold, New Zealand 1982–2012 HES Years



Source: Perry 2014 [1] derived from Statistics NZ Household Economic Survey (HES) 1982–2012

Figure 12 reviews the proportion of children aged 0–17 years living in households with incomes below 50% of the contemporary median, before (BHC) and after (AHC) adjusting for housing costs. Using the <50% poverty measure, during the 1980s the proportion of children living in poverty was similar before and after adjusting for housing costs. However, from 1992 onwards, child poverty rates were much higher after adjusting for housing costs, with the most rapid rises in child poverty between 1990 and 1994 being seen when the AHC measure was used. While child poverty rates in 2012 were similar to those in the early 1980s using the BHC measure, rates remained much higher than in the 1980s when the AHC measure was used.

An increase in child poverty (<50% AHC measure) was also evident between 2007 and 2011, with 20% of children living in severe poverty during 2012 (**Figure 12**).

Poverty Persistence

The child poverty measures in the previous section were based on data from the Household Economic Survey (HES), which samples a different set of households in each survey. As a consequence, it is not possible to use HES data to explore poverty persistence. However, Statistics NZ's Survey of Family, Income and Employment (SoFIE), which began in October 2002, follows the same group of individuals from one survey to the next, with longitudinal data now being available for seven years, from 2002–2003 to 2008–2009 [2].

The following section uses SoFIE data to review the proportion of children who were aged 0–17 years (60% gross median threshold) or 0–11 years (50% gross median threshold) in 2002–2003, and who experienced persistent poverty (i.e. an average family income below the low income threshold) across the seven years.

Data Source and Methods

Definition

1. *Proportion of Children Aged 0–17 years (60% gross median threshold) in Year One of Statistics New Zealand's Survey of Family, Income and Employment (SoFIE) who were exposed to persistent poverty*

2. *Proportion of Children Aged 0–11 years (50% gross median threshold) in Year One of Statistics New Zealand's Survey of Family, Income and Employment (SoFIE) who were exposed to persistent poverty*

Data Source

Statistics New Zealand's Survey of Family, Income and Employment (SoFIE)

The information in this section is drawn from Perry's 2013 Household Incomes Report [2], which in turn is based on a recently published analysis of SoFIE data by Carter and Imlach Gunasekara (2012) [12] and some otherwise unpublished data provided to Perry by Carter and Imlach Gunasekara.

Interpretation

The initial SoFIE sample in 2002–03 included around 11,500 households with almost 30,000 respondents (22,000 being aged 15+ years). By the final year (2008–09), just under 14,000 adults (aged 15+ years) were left. The overall attrition rate (63% remaining after seven years) is comparable to similar international longitudinal surveys. In this analysis, SoFIE participants who were eligible in the first year (2002–03) and who responded in all seven survey years have been included, giving a sample of just under 19,000.

Persistent Poverty: In this analysis, participants' average income over the seven years was compared with an average low income (poverty) line over the same period. People whose income was below the average low income (poverty) line, when averaged across all seven years were said to be in persistent poverty. As income was averaged across all seven years, participants may have been above the income poverty line in some years, but still classified as being in persistent poverty, as on average across the seven years their income fell below the income poverty line [2].

Current Poverty: Participants were considered to be in current poverty if they fell below the income poverty line for which ever survey year was under review [2].

Note: In this analysis the poverty benchmarks used are based on 50% and 60% of gross income. This is different to the benchmarks used in the earlier income poverty section which are based on 60% of disposable income. Perry [2] notes that the two 60% benchmarks are not comparable (due to differences in the methodology used), and that that where comparisons are required, that the 50% gross is the most appropriate, as it is closer to the usual poverty figures reported (60% median disposable income).

Proportion in Current and Persistent Income Poverty

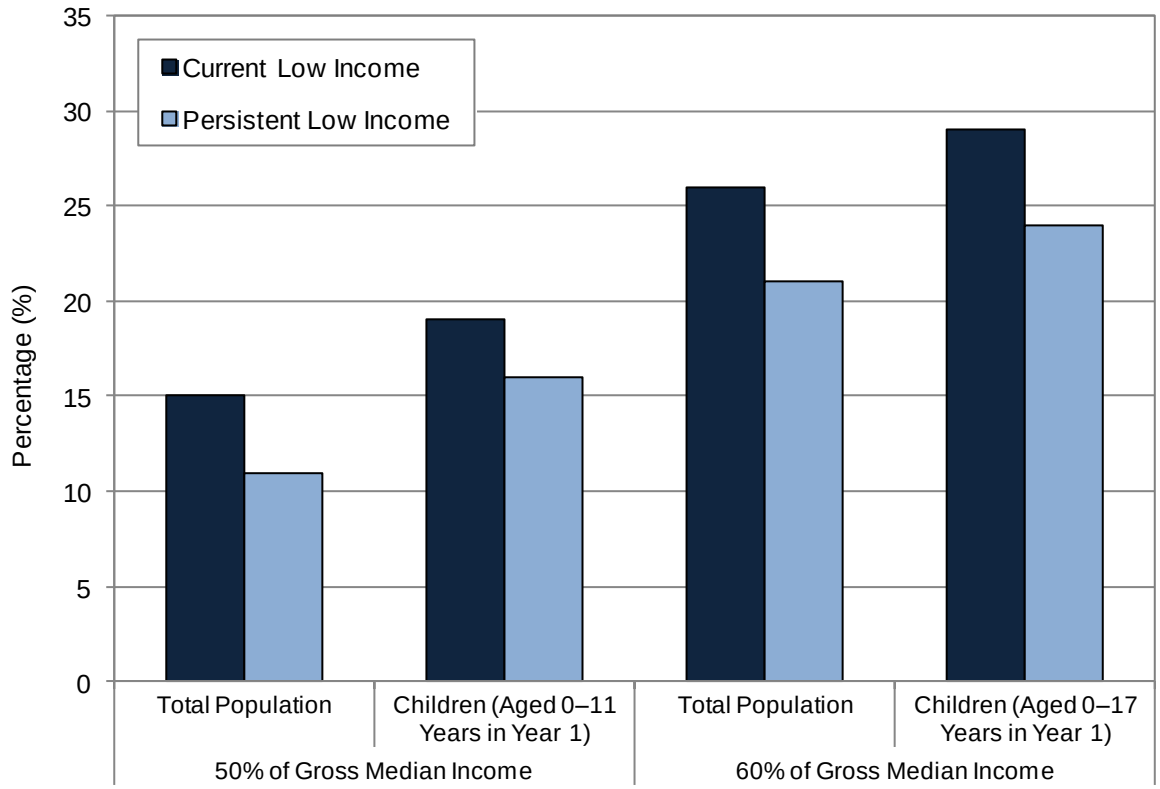
<60% Gross Median Threshold

When averaged across all seven SoFIE years, 24% of children who were aged 0–17 years in the first year (2002–2003), lived in households exposed to persistent poverty (i.e. an income which, when averaged across all seven years, was below 60% of the gross median). However, 29% were deemed to be in current poverty (i.e. with an income below 60% of the gross in the year under review) (**Figure 13**). The reason for this discrepancy is because in any given year, those in poverty comprise a mix of those who have transiently moved into poverty and will move out in later surveys, and those who are living in long term poverty.

<50% Gross Median Threshold

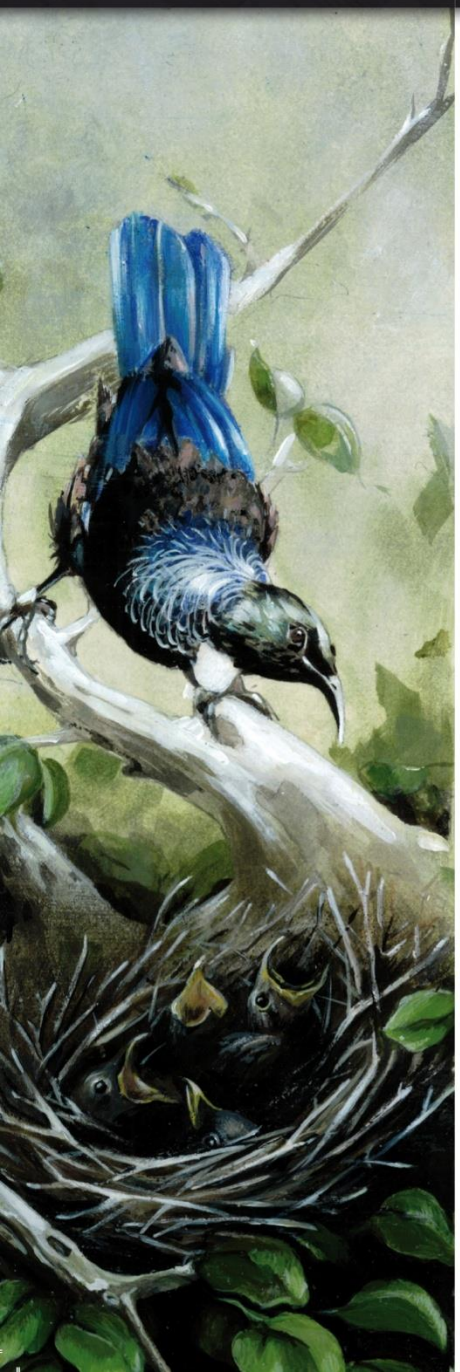
If the more stringent 50% of the gross median income threshold was used, then 16% of children who were aged 0–11 years in the first year (2002–03), were deemed to be in persistent poverty and 19% in current poverty (**Figure 13**). Perry [2] notes that in any one year, 60% of those in current poverty were also in persistent poverty (using the 50% gross median threshold). There was also a further group of children that, while not in poverty in the current year, were exposed to persistent poverty when averaged over the seven survey years.

Figure 13. Proportion of Children with Current and Persistent Low Incomes, Statistics New Zealand's Survey of Family, Income and Employment (SoFIE) 2002–2009



Source: Perry 2013 [2] derived from Statistics NZ's Survey of Family, Income and Employment 2002–2009

WIDER ECONOMIC CONTEXT



GROSS DOMESTIC PRODUCT (GDP)

Introduction

Gross Domestic Product (GDP) is defined as "*the total market value of goods and services produced within a given period, after deducting the cost of goods utilised in the process of production*" [13]. GDP is often used as a measure of the size of the economy, with nominal GDP being expressed in current dollar prices, and real GDP being expressed in constant dollar prices (i.e. the dollar value of a particular year, after adjustment for inflation).

Changes in real GDP are often used as a measure of economic growth, or the strength of the economy [13], with a recession typically being defined as two consecutive quarters of negative growth [14]. Recessions are often characterised by high unemployment, stagnant wages and a fall in retail sales, and though usually not lasting longer than a year [14], they may have significant implications for child wellbeing. New Zealand entered a recession at the end of June 2008 (after two consecutive quarters of negative growth), and left the recession at the end of September 2009 (when growth had increased to 0.3% [15]).

The following section briefly reviews changes in New Zealand's GDP since March 2006.

Data Source and Methods

Definition

Gross Domestic Product (GDP): Percent Change from Previous Quarter

GDP is the total market value of all final goods and services produced in a country in a given year, equal to total consumer, investment and government spending, plus the value of exports, minus the value of imports. A recession is defined as two consecutive quarters of negative growth (as measured by GDP).

Data Source

Statistics New Zealand: The New Zealand System of National Accounts. Produced Quarterly

Notes on Interpretation

Three approaches can be used to calculate GDP:

• *Production Approach*: This method calculates what each separate producer adds to the value of final output by deducting intermediate consumption from gross output. Value added is summed for all producers.

• *Income Approach*: This approach measures the incomes received by the owners of the factors of production. These represent the returns to the labour and capital employed such as wages and salaries, and profits.

• *Expenditure Approach*: This method sums the values of all final demands, that is, final consumption expenditures (of households, government and private non-profit institutions serving households), changes in inventories, gross capital formation, and net exports.

Conceptually, both the production and expenditure approaches of measuring GDP are the same. However, as each series uses independent data and estimation techniques, some differences between the alternative measures arise. The expenditure approach series has historically shown more quarterly volatility and is more likely to be subject to timing and valuation problems. For these reasons, the production-based measure is the preferred measure for short-term quarter-on-quarter and annual changes [15]

New Zealand Trends

Production-Based Measure of GDP

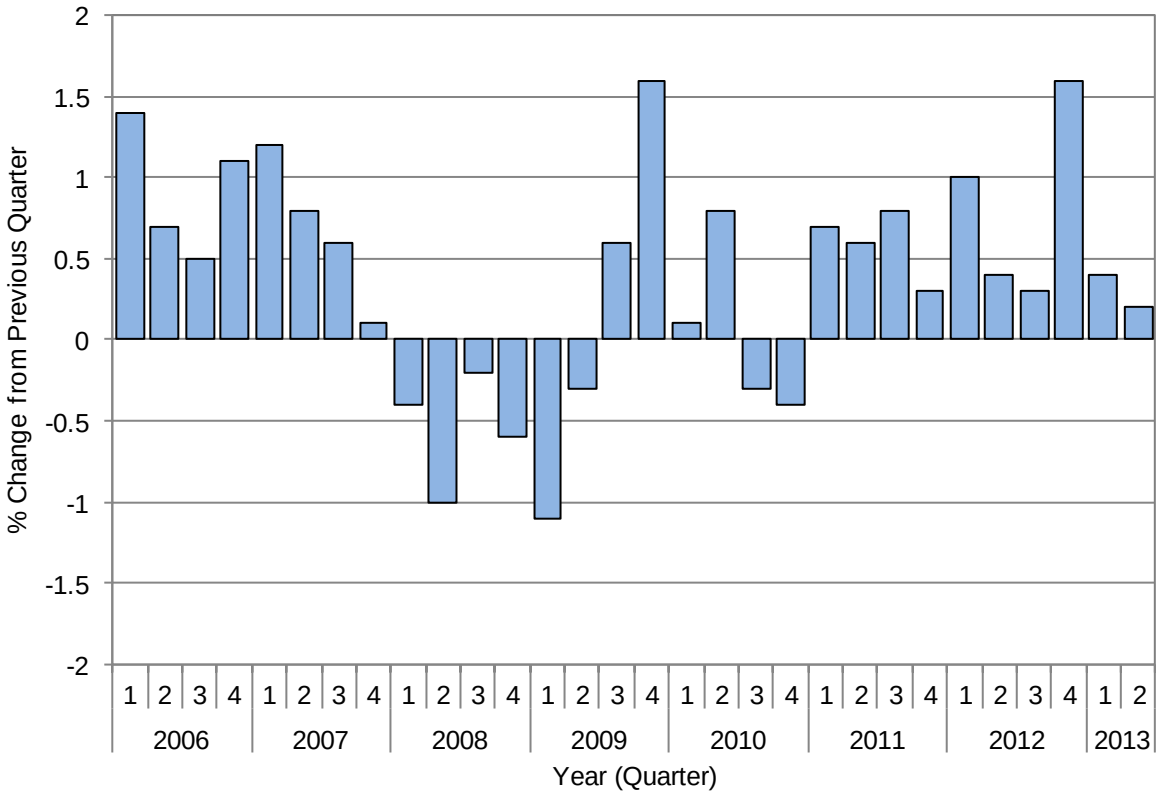
In New Zealand, GDP decreased for six consecutive quarters from March 2008 to June 2009, before increasing again, for four consecutive quarters, from September 2009 to September 2010. GDP then declined for two quarters, before increasing again, for ten consecutive quarters from March 2011 to June 2012. GDP grew by 0.2% in the June quarter of 2013 (**Figure 14**). Economic activity for the year ending June 2013 increased by 2.7%, when compared to the year ending June 2012 [16].

During the June 2013 quarter, business services (up 2.6 percent), construction (up 2.3 percent), and retail trade and accommodation (up 2.1 percent) were the main drivers of growth. Agriculture (down 6.4 percent) had the largest decline [16].

Expenditure-Based Measure of GDP

The expenditure-based measure of GDP released concurrently with the production-based measure, increased by 0.1% in the June quarter of 2013. During this period, household consumption expenditure (up 1.5 percent) and gross fixed capital formation (up 3.8 percent) had the largest increases. Exports of goods and services decreased 5.9 percent, driven by a fall in export volumes of dairy products (down 16.8 percent). On an annual basis, expenditure on GDP for the year ending June 2013 increased by 2.7%, when compared to the year ending June 2012 [16].

Figure 14. Gross Domestic Product (GDP): Percentage Change from Previous Quarter, New Zealand March Quarter 2006 to June Quarter 2013



Source: Statistics New Zealand; Seasonally adjusted chain volume series expressed in 1995/96 prices

INCOME INEQUALITY

Introduction

There has been much debate regarding the influence of income inequality on population health. While it is widely acknowledged that poverty plays a crucial role in shaping health disparities, authors such as Wilkinson and Marmot [17] argue that income inequality itself also plays a role, via its links to psychosocial pathways associated with relative disadvantage. They cite the Whitehall studies of British civil servants that found that mortality increased in a stepwise manner as relative socioeconomic status decreased with social gradients being evident even amongst those who were not poor. In addition, they note that while health inequalities exist within societies, there is little association between average income (GDP per capita) and life expectancy across rich countries. Rather, there appears to be a strong correlation between income inequality and mortality. In Wilkinson and Marmot's view such associations suggest that it is not absolute material deprivation which shapes health at the population level, but rather the effects such inequalities have on psychosocial outcomes such as the degree of control over work, anxiety, depression and social affiliations [17].

Others such as Lynch [18] however, would argue that it is not the psychological effects of income inequality which play the greatest role, but rather the lack of material resources (e.g. differentials in access to adequate nutrition, housing and healthcare), coupled with a systematic underinvestment in human, physical, health and social infrastructure (e.g. the types and quality of education, health services, transportation, recreational facilities and public housing available). In Lynch's view, the combination of these negative exposures is particularly important for the health of the most disadvantaged (who have the fewest individual resources), and that in this context, the associations between income inequality and health are not inevitable, but rather are contingent on the level of public infrastructure and resources available. While debate on the precise pathways continues, both sides of the income inequality argument agree that reducing income inequality by raising incomes for the most disadvantaged will improve population health [19].

The following section explores income inequalities in New Zealand since 1982 using two different measures, the P80/P20 Ratio and the Gini Coefficient.

Definition

1. *Income Inequality as measured by the P80/P20 Ratio*

2. Income Inequality as measured by the Gini Coefficient

Data Source

Statistics New Zealand Household Economic Surveys (NZHES n=2,800–3,500 households per survey) via Perry 2013 [2], with revised data for 2010–2012 being sourced from Perry 2014 [1].

Note 1: The P80/P20 Ratio and Gini coefficient are monitored by the Ministry of Social Development using NZHES data which was available 2-yearly from 1982 to 1998, and 3-yearly thereafter. Since 2007, income data has become available annually through the new NZHES Incomes Survey. The full NZHES (including expenditure data) however remains 3-yearly. For more detail on the methodology used see Perry 2013 [2].

Note 2: In February 2014, Treasury and Statistics NZ advised that there had been an error in the calculation of household incomes, which impacted on the calculation of the P80/20 Ratio and the Gini Coefficient for the 2010–2012 years [1]. The figures presented here, which have been revised to include the corrected data, may thus differ from those presented in previous NZCYES reports.

Notes on Interpretation

P80/P20 Ratio: When individuals are ranked by equivalised household income and then divided into 100 equal groups, each group is called a percentile. If the ranking starts with the lowest income, then the income at the top of the 20th percentile is denoted P20 and the income at the top of the 80th percentile is called P80. The ratio of the value at the top of the 80th percentile to the value at the top of the 20th percentile is called the P80/20 ratio and is often used as a measure of income inequality (e.g. a P80/20 ratio of 3.0 indicates that those at the top of the 80th percentile have incomes 3.0x higher than those at the top of the 20th percentile). In general, the higher the ratio, the greater is the level of inequality [20].

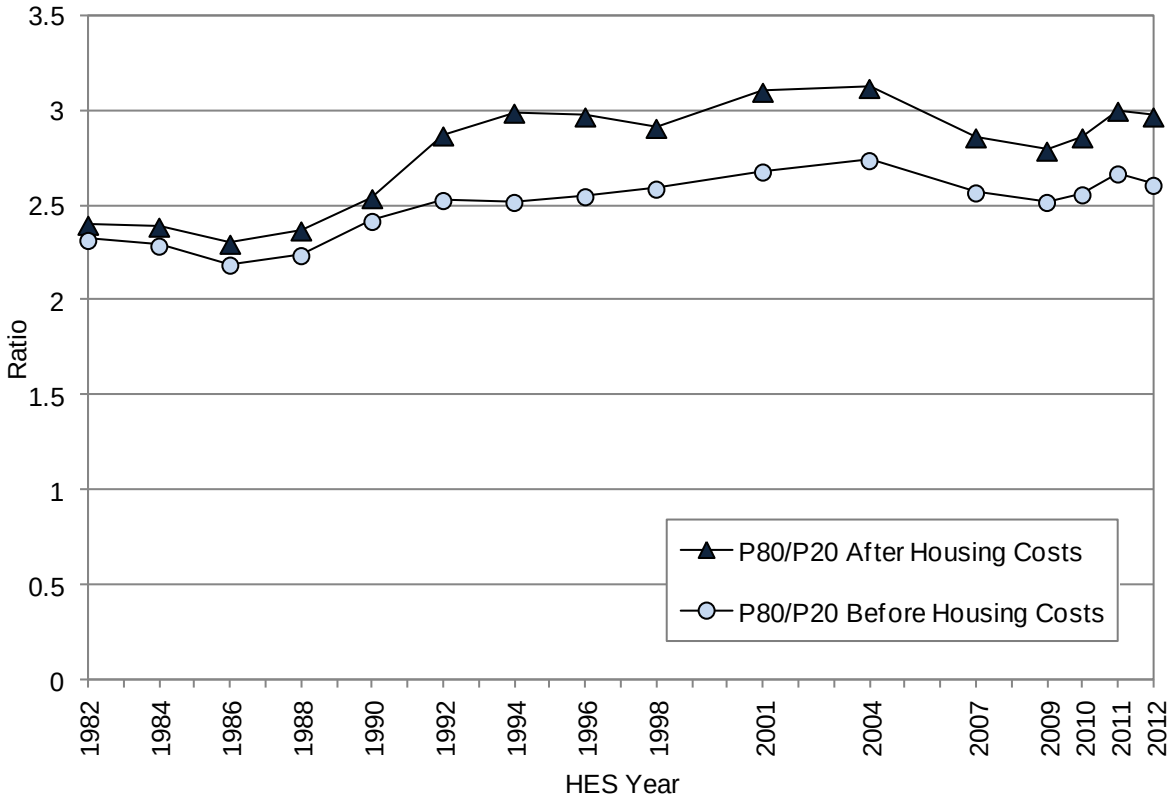
Gini Coefficient: The Lorenz curve is a graph with the horizontal axis showing the cumulative % of people in a population ranked by their income. The vertical axis shows the corresponding cumulative % of equivalised disposable household income (i.e. the graph shows the income share of any selected cumulative proportion of the population). The diagonal line represents a situation of perfect equality (i.e. all people having the same income). The Gini coefficient is derived from the Lorenz curve and is the ratio of the area between the actual Lorenz curve and the diagonal (or line of equality), compared to the total area under the diagonal. When the Gini coefficient = 0 all people have the same level of income. When it approaches 1, one person receives all the income (i.e. it is an overall measure of income inequality: the higher the number, the greater the level of inequality) [21]. When comparing changes in income distributions over time, the Gini coefficient is more sensitive to changes in the more dense low-to-middle parts of the distribution, than it is to changes towards the ends of the distribution [22].

New Zealand Trends

Income Inequality: P80/P20 Ratio

In New Zealand during 1982–2012 income inequality, as measured by the P80/P20 ratio, was higher after adjusting for housing costs, as housing costs generally make up a greater proportion of household income for lower income than for higher income households. The most rapid rises in income inequality occurred during 1988–1992. While income inequality also rose during 1994–2004, the rate of increase was slower. During 2004–2007, income inequality fell, a decline which Perry attributes to the Working for Families package. During 2009–2011 the impact of the economic downturn and global financial crisis led to an increase in inequality, although Perry notes that it may take one or two further surveys before the post-crisis inequality level becomes clear [2] (**Figure 15**).

Figure 15. Income Inequality in New Zealand as Assessed by the P80/P20 Ratio for the 1982–2012 HES Years

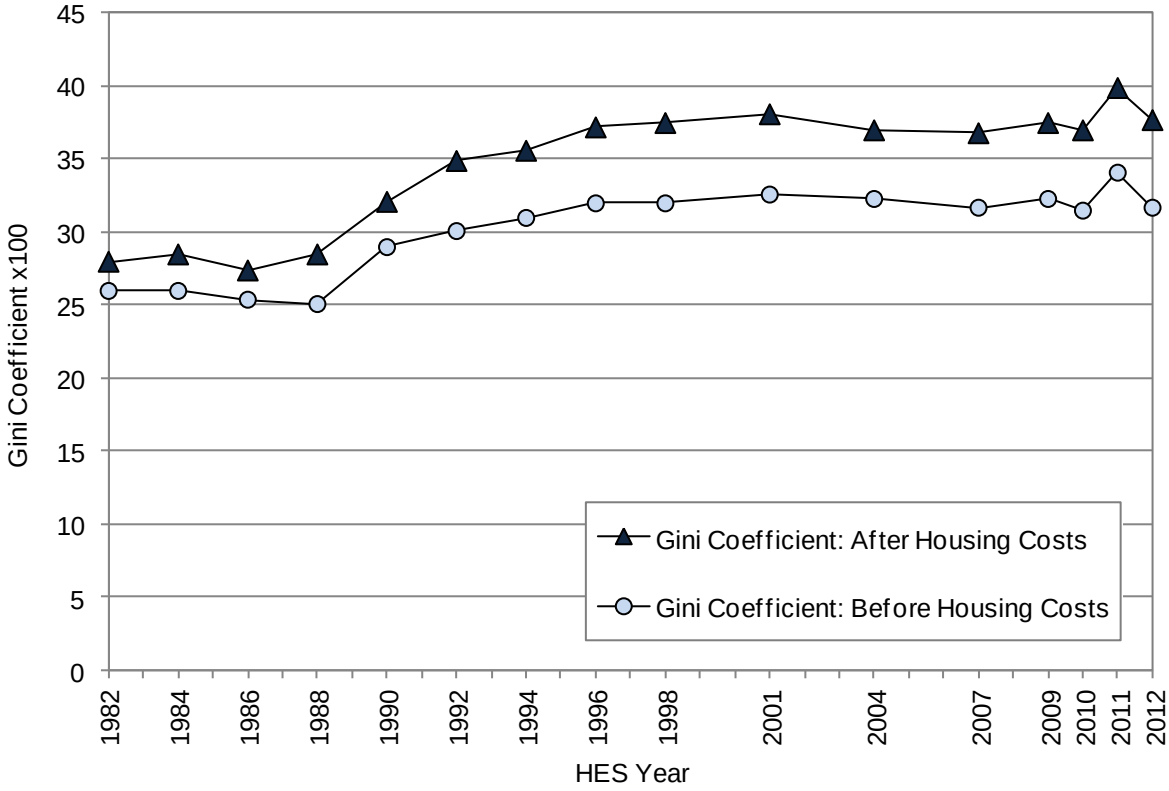


Source: Perry 2014 [1] derived from Statistics NZ Household Economic Survey (HES) 1982–2012

Income Inequality: Gini Coefficient

In New Zealand during 1982–2012 income inequality, as measured by the Gini coefficient, was also higher after adjusting for housing costs, for the same reasons as given above. The most rapid rises in income inequality also occurred between the late 1980s and early 1990s. Using both the before and after housing cost measures, the Gini Coefficient declined slightly between 2001 and 2007, a decline which Perry attributes to improving employment and the impact of the Working for Families package. During 2009–2012, however, there was considerable volatility in the Gini coefficient, which Perry attributes to the differing size and timing of the impact of the global financial crisis, Christchurch earthquakes and the associated economic downturn and recovery on different parts of the income distribution. While Perry notes it may take one or two more surveys to see where the inequality trend will settle, he also notes that the overall trend line for this period was flat [2] (**Figure 16**).

Figure 16. Income Inequality in New Zealand as Assessed by the Gini Coefficient for the 1982–2012 HES Years



Source: Perry 2014 [1] derived from Statistics NZ Household Economic Survey (HES) 1982–2012

UNEMPLOYMENT RATES

Introduction

Unemployment rates were relatively low in New Zealand during the mid-2000s but began to rise in late 2008. Rates reached a peak of 6.9% in the fourth quarter of 2009, and have remained in the mid-high 6% range ever since, with the exception of the 3rd quarter of 2012, when they briefly rose to 7.2%. Throughout this period, unemployment rates have remained higher for Māori and Pacific people, young people (particularly those 15–19 years) and those without formal qualifications [23]. Such increases are of concern for New Zealand children and young people for two reasons.

Firstly, research suggests that children in families where their parents are unemployed have higher rates of psychosomatic symptoms, chronic illnesses and low wellbeing. While the magnitude of these associations is reduced once other mediating factors are taken into account (e.g. parents' former occupation, sole parent status, and migrant status), the associations do not disappear completely [24]. Further, research suggests that these negative effects may be mediated via the impact unemployment has on parents' mental health, with the distress associated with decreased social status, disruption of roles, loss of self-esteem and increased financial strain, all impacting negatively on parents' emotional state [24]. This in turn may lead to non-supportive marital interactions, compromised parenting, and children's internalising (e.g. withdrawal, anxiety, depression) and externalising (e.g. aggressive or delinquent behaviour, substance abuse) behaviour [25].

Secondly, for young people research suggests that unemployment leads to a range of negative psychological outcomes including depression, anxiety and low self-esteem, which are in turn associated with adverse outcomes such as heavy tobacco, alcohol and drug use; and higher mortality from suicide and accidents [26]. While social support may reduce the psychological distress associated with unemployment, the type of support provided is important (e.g. while positive support from family and friends decreases psychological distress amongst unemployed youth, parental advice may at times increase distress, as it may be perceived as pressure to find a job [26]). On a more positive note, research also suggests that this psychological distress decreases once young people find permanent employment, or return to further education [26].

The following section uses information from Statistics New Zealand's Quarterly Household Labour Force Surveys, to review unemployment rates since 1986.

Data Source and Methods

Definition

1. *Unemployment Rate: The number of unemployed people expressed as a percentage of the labour force*

Data Source

Statistics New Zealand's Household Labour Force Survey (n≈15,000 households). Quarterly since March 1986 and available on Statistics New Zealand's website www.stats.govt.nz

Notes on Interpretation

Unemployed refers to all people in the working-age population who during the reference week were without a paid job, were available for work and:

(a) had actively sought work in the past four weeks ending with the reference week, or

(b) had a new job to start within four weeks [27]

Note 1: A person whose only job search method in the previous four weeks has been to look at job advertisements in the newspapers is not considered to be actively seeking work.

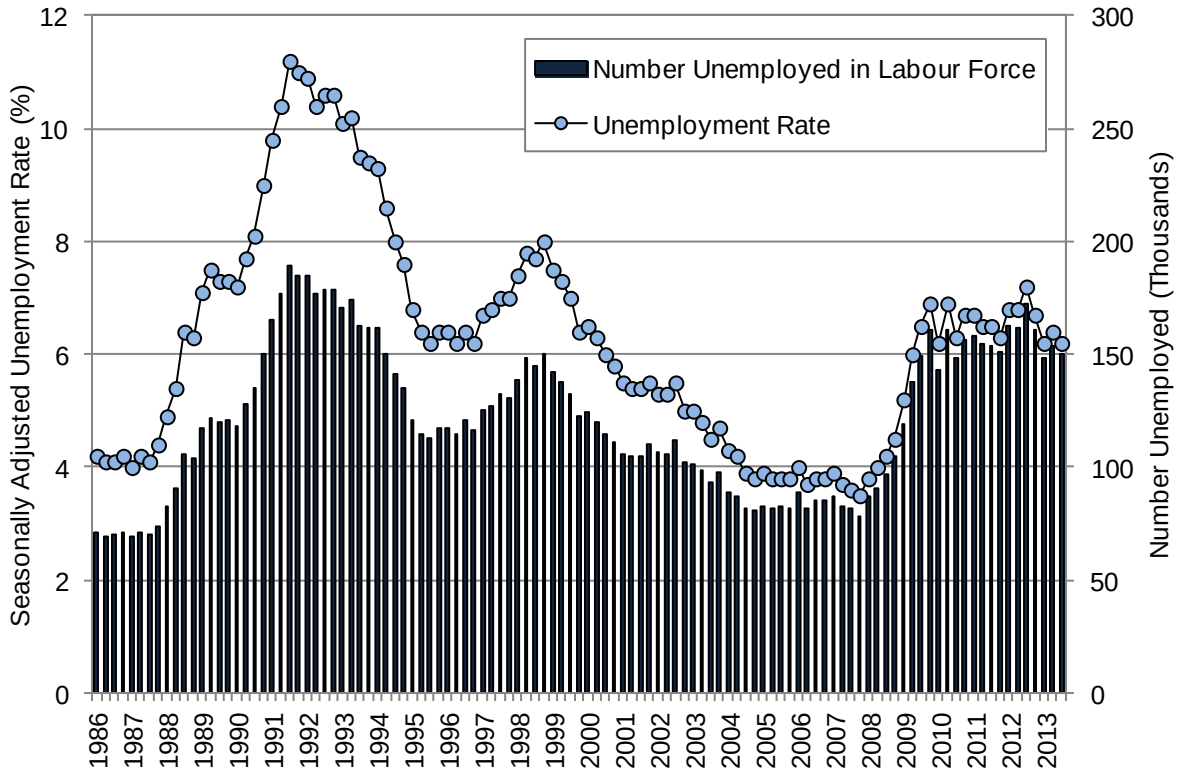
Note 2: Seasonal adjustment makes data for adjacent quarters more comparable by smoothing out the effects of any regular seasonal events. This ensures the underlying movements in time series are more visible. Each quarter, the seasonal adjustment process is applied to the latest and all previous quarters. This means that seasonally adjusted estimates for previously published quarters may change slightly [28].

New Zealand Distribution and Trends

Seasonally Adjusted Unemployment Rates

In the quarter ending September 2013, the seasonally adjusted unemployment rate fell to 6.2%, while seasonally adjusted unemployment numbers decreased from 154,000 in the June quarter of 2013, to 150,000 in the September quarter (**Figure 17**). The number of people employed increased by 27,000 to reach 2,272,000 [29].

Figure 17. Seasonally Adjusted Unemployment Rates, New Zealand Quarter 1 (March) 1986 to Quarter 3 (September) 2013



Source: Statistics New Zealand, Household Labour Force Survey; Note: Rates have been seasonally adjusted

Unemployment Rates by Age

In New Zealand during September 1987–2013, unemployment rates were consistently higher for younger people (15–19 years > 20–24 years > 25–29 years > 35–39 years and 45–49 years). During the year ending September 2013, annual unemployment rates were 26.1% for those aged 15–19 years and to 11.6% for those aged 20–24 years (**Figure 18**).

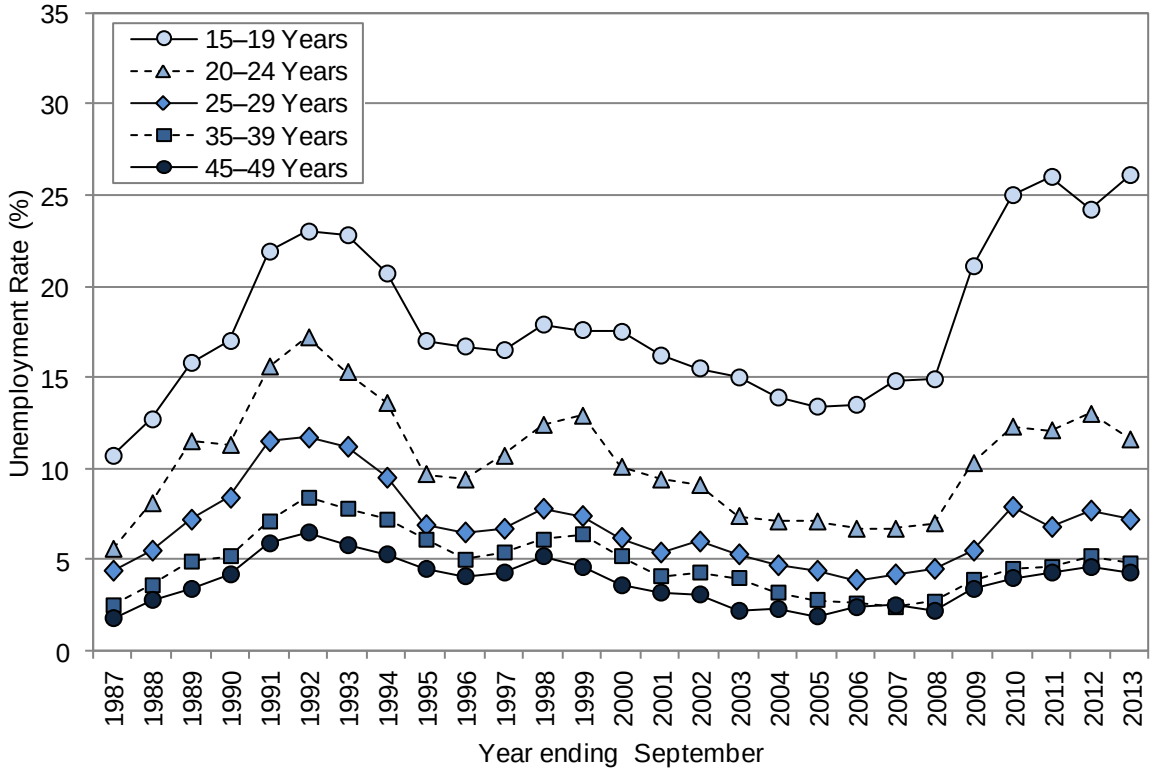
Unemployment Rates by Age and Gender

In New Zealand during September 1987–2013, there were no consistent gender differences in unemployment rates for young people aged 15–24 years. During the year ending September 2013, unemployment rates for those aged 15–19 years were 26.3% for females and 25.8% for males, while for those aged 20–24 years, rates were 12.5% for females and 10.9% for males (**Figure 19**).

Unemployment Rates by Ethnicity

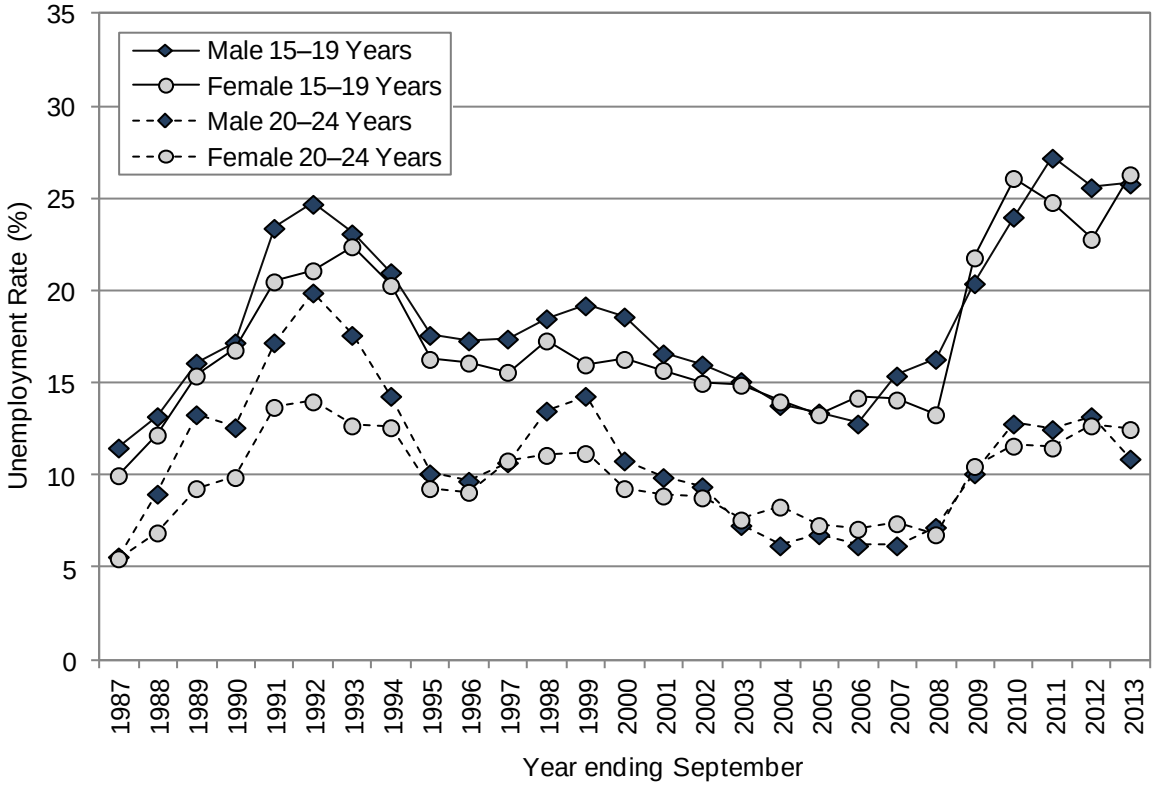
In New Zealand during 2008(Q1)–2013(Q3) unemployment rates were consistently higher for Māori and Pacific, followed by Asian/Indian and then European people. Unemployment rates increased for all ethnic groups during 2008 and 2009, but were more variable during 2010(Q1)–2013(Q3). During 2013(Q3), unemployment rates were 15.7% for Pacific, 12.2% for Māori, 6.7% for Asian/Indian and 4.9% for European people (**Figure 20**).

Figure 18. Unemployment Rates by Age (Selected Age Groups), New Zealand Years Ending September 1987–2013



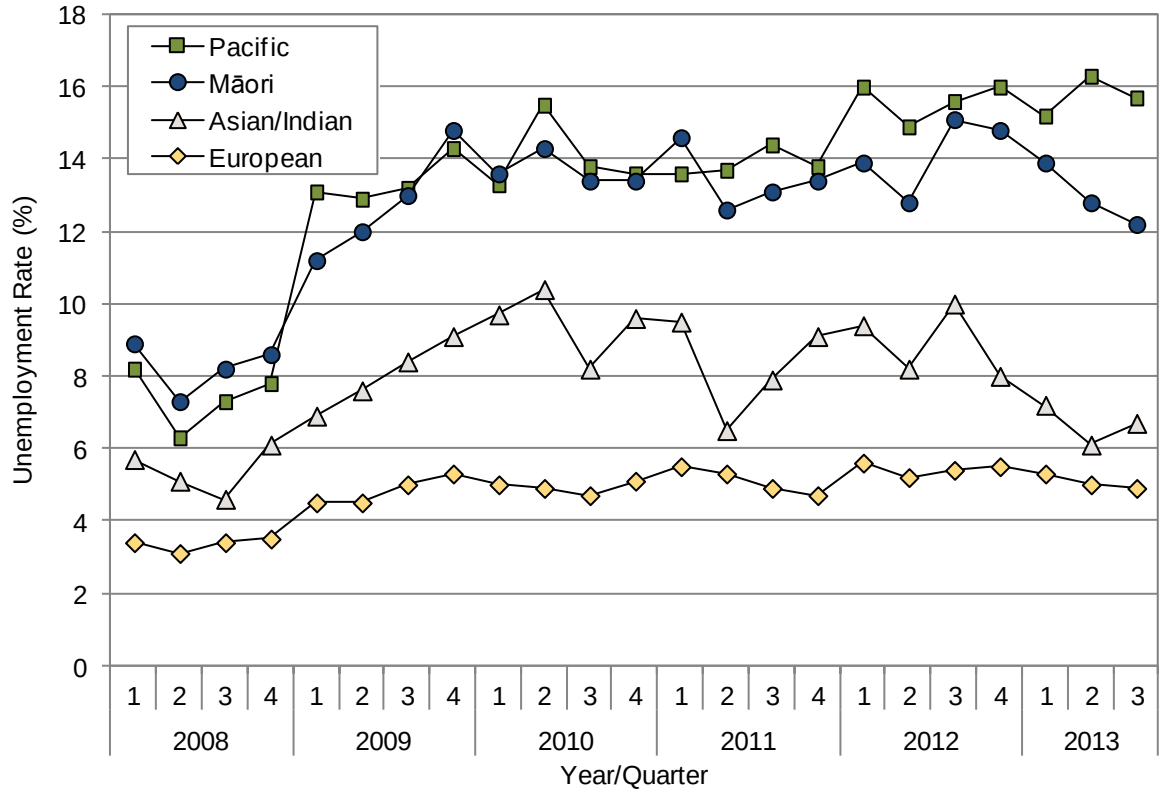
Source: Statistics New Zealand Household Labour Force Survey

Figure 19. Unemployment Rates by Age and Gender in Young People Aged 15–24 Years, New Zealand Years Ending September 1987–2013



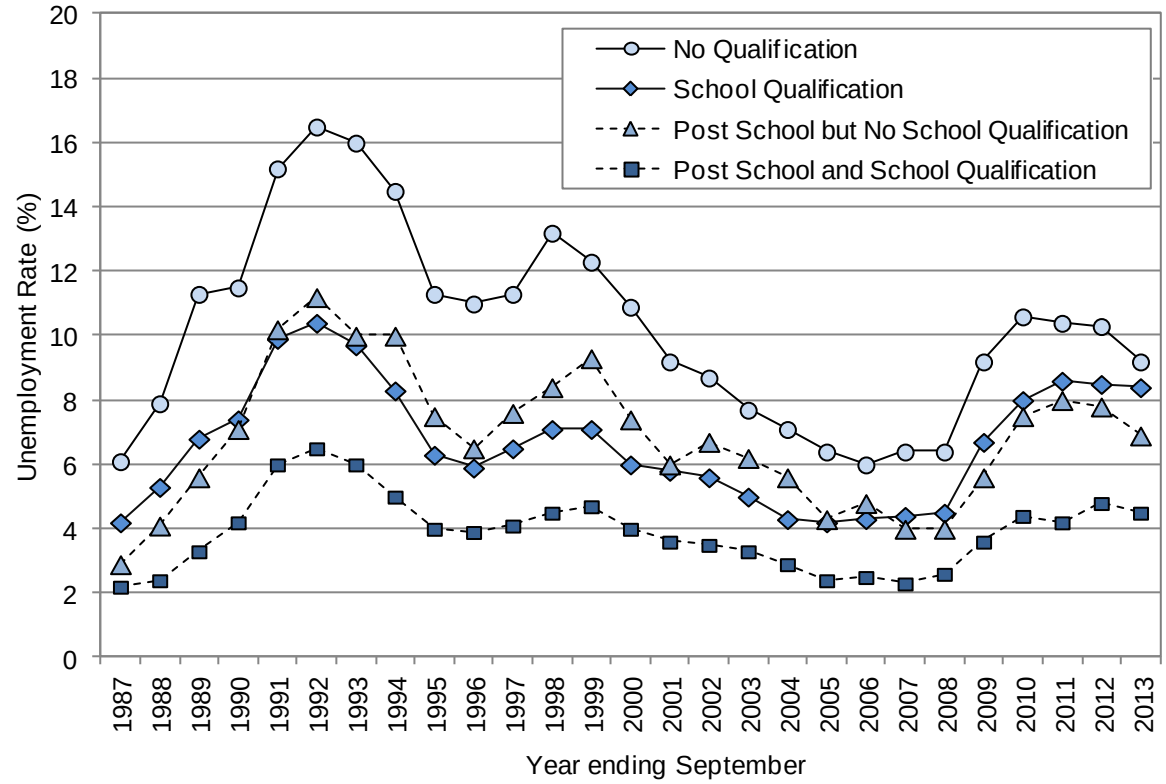
Source: Statistics New Zealand Household Labour Force Survey

Figure 20. Unemployment Rates by Ethnicity, New Zealand Quarter 1 (March) 2008 to Quarter 3 (September) 2013



Source: Statistics New Zealand Household Labour Force Survey; Note: Ethnicity is Total Response

Figure 21. Unemployment Rates by Qualification, New Zealand Years Ending September 1987–2013



Source: Statistics New Zealand Household Labour Force Survey

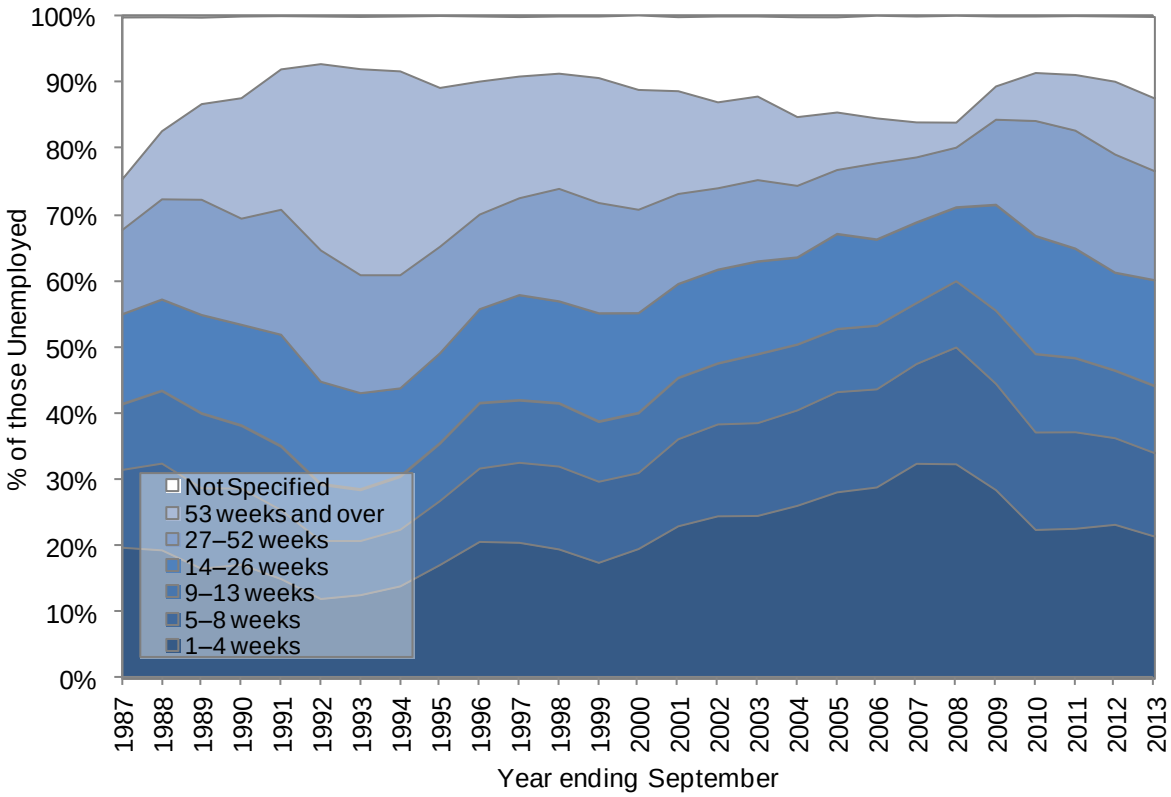
Unemployment Rates by Qualification

In New Zealand during September 1987–2013, unemployment rates were higher for those with no qualifications, followed by those with school qualifications, or post school but no school qualifications. Rates were lowest for those with both post school and school qualifications. In the year ending September 2013, unemployment rates were 9.2% for those with no qualifications, 8.4% for those with school qualifications, 6.9% for those with post school but no school qualifications and 4.5% for those with post school and school qualifications (**Figure 21**).

Duration of Unemployment

In New Zealand during September 1987–2013, duration of unemployment varied markedly, and in a manner consistent with prevailing unemployment rates. Thus the highest proportion of people unemployed for 53+ weeks occurred during the early to mid-1990s, when unemployment rates were at their peak, while the highest proportion unemployed for only 1–4 weeks occurred in the mid to late 2000s, when unemployment rates were at their lowest (**Figure 22**).

Figure 22. Proportion of those Unemployed by Duration of Unemployment, New Zealand Years Ending September 1987–2013



Source: Statistics New Zealand Household Labour Force Survey

CHILDREN RELIANT ON BENEFIT RECIPIENTS

Introduction

In New Zealand, children who are reliant on benefit recipients are a particularly vulnerable group, with the 2008 Living Standards [8] survey finding that 59% of children whose main source of family income was a benefit lived in families that experienced material hardship. Such families were much more likely to report living in houses that were damp or mouldy, or in very poor physical condition; that their children were having to continue to wear worn out shoes or clothing; and that they were postponing doctors' visits because of cost. All these are factors that are likely to impact adversely on children's health and wellbeing.

The following section thus reviews the number of children aged 0–17 years who were reliant on a benefit recipient during June 2000–2013, using information from the Ministry of Social Development's SWIFTT database. While the number of children reliant on a benefit recipient does not correlate precisely with the number living in significant hardship, they nevertheless reflect a particularly vulnerable group, who may have higher health needs, and as a consequence, may impact significantly on future health service demand.

Data Source and Methods

Definition

1. Number of children aged 0–17 years reliant on a benefit recipient by benefit type

Data Source

Numerator: SWIFTT Database: Number of children aged 0–17 years who were reliant on a benefit recipient

Denominator: Statistics NZ Estimated Resident Population as at 30 June

Notes on Interpretation

Note 1: All data in this section were provided by the Ministry of Social Development (MSD) and were derived from the SWIFTT database. SWIFTT was developed by the NZ Income Support Service to calculate, provide and record income support payments and related client history [30]. It is thus able to provide information on the recipients of financial assistance through Work and Income.

Note 2: All figures refer to the number of children reliant on a benefit recipient at the end of June and provide no information on those receiving assistance at other times of the year.

Note 3: "Other Benefits" includes: Domestic Purposes Benefit - Women Alone and Caring for Sick or Infirm, Emergency Benefit, Independent Youth Benefit, Unemployment Benefit Training and Unemployment Benefit Training Hardship, Unemployment Benefit Student Hardship, Widows Benefit, NZ Superannuation, Veterans and Transitional Retirement Benefit. "Other Benefits" *does not include* Orphan's and Unsupported Child's Benefits, or Non-benefit assistance.

To be eligible for a benefit, clients must have insufficient income from all sources to support themselves and any dependents and meet specific eligibility criteria. The current eligibility criteria for benefits can be found at http://www.workandincome.govt.nz/individuals/a-z-benefits/

New Zealand Distribution and Trends

Number of Children Reliant on a Benefit Recipient

In New Zealand, the number of children aged 0–17 years who were reliant on a benefit recipient declined from 271,463 in June 2000, to 200,525 in June 2008, before increasing again to 233,633 in June 2010. By June 2013, 214,746 children were reliant on a benefit recipient. Much of this variation can be attributed to changes in children relying on unemployment benefit recipients, with numbers falling from 51,124 in June 2000 to 5,243 in June 2008, before increasing again to 17,281 in June 2010. By June 2013, 12,622 children were reliant on an unemployment benefit recipient. The number of children reliant on Domestic Purposes Benefit (DPB) recipients also fell from 185,658 in June 2000, to 157,693 in June 2008, before increasing again to 179,784 in June 2011. By June 2013, 165,113 children were reliant on a DPB recipient (**Table 4**).

Table 4. Number of Children Aged 0–17 Years who were Reliant on a Benefit Recipient by Benefit Type, New Zealand, June 2000–2013

Year	Domestic Purposes		Unemployment		Invalid's		Sickness		Other Benefits		Total
	Number	%*	Number	%*	Number	%*	Number	%*	Number	%*	Number
2000	185,658	68.4	51,124	18.8	11,205	4.1	11,425	4.2	12,051	4.4	271,463
2001	184,448	70.2	43,688	16.6	12,164	4.6	11,155	4.2	11,468	4.4	262,923
2002	184,497	72.0	36,960	14.4	13,290	5.2	11,836	4.6	9,611	3.8	256,194
2003	186,288	73.6	30,257	12.0	14,306	5.7	12,477	4.9	9,701	3.8	253,029
2004	186,372	76.0	20,413	8.3	15,091	6.2	13,782	5.6	9,711	4.0	245,369
2005	179,791	77.1	14,968	6.4	15,277	6.6	13,892	6.0	9,267	4.0	233,195
2006	171,011	77.3	11,422	5.2	15,291	6.9	13,775	6.2	9,598	4.3	221,097
2007	160,137	78.1	6,800	3.3	15,197	7.4	13,509	6.6	9,394	4.6	205,037
2008	157,693	78.6	5,243	2.6	16,045	8.0	11,980	6.0	9,564	4.8	200,525
2009	168,709	76.3	13,943	6.3	15,605	7.1	13,025	5.9	9,855	4.5	221,137
2010	177,874	76.1	17,281	7.4	14,840	6.4	13,798	5.9	9,840	4.2	233,633
2011	179,784	77.2	15,486	6.7	14,044	6.0	13,351	5.7	10,144	4.4	232,809
2012	177,237	78.1	13,205	5.8	13,287	5.9	12,955	5.7	10,212	4.5	226,896
2013	165,113	76.9	12,622	5.9	12,804	6.0	12,590	5.9	11,617	5.4	214,746

Source: MSD SWIFTT Database; Note: *% refers to % of children relying on benefit recipients, rather than % of all children; Note: For composition of “Other Benefits” see Data Source and Methods box above.

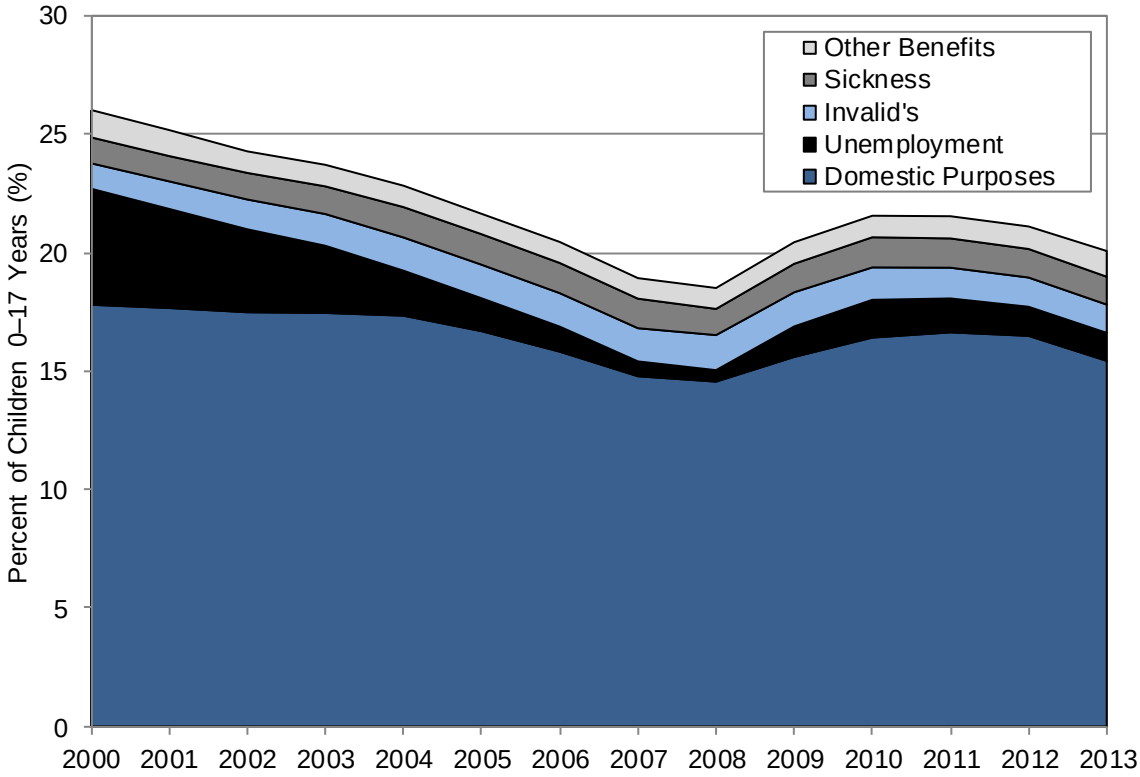
Proportion of Children Reliant on a Benefit Recipient

In New Zealand, the proportion of children aged 0–17 years who were reliant on a benefit recipient initially fell, from 26.0% in June 2000, to 18.5% in June 2008. Rates then increased again, to reach a peak of 21.6% in June 2010, before falling again to 20.1% in June 2013 (**Figure 23**).

A large part of the initial decline was due to a fall in the proportion of children reliant on unemployment benefit recipients, with rates falling from 4.9% of children in June 2000, to 0.5% in June 2008. Rates then increased, to 1.6% in June 2010, before falling again to 1.2% in June 2013 (**Figure 23**).

The proportion of children reliant on DPB recipients also fell, from 17.8% in June 2000, to 14.6% in June 2008, before increasing to 16.6% in June 2011. Rates then fell again, to 15.4% in June 2013 (**Figure 23**). During this period, the rate of decline for those reliant on DPB recipients was much slower than for those reliant on unemployment benefit recipients, meaning that in relative terms, the proportion of benefit-dependent children reliant on DPB recipients actually increased, from 68.4% of benefit-dependent children in June 2000, to 76.9% in June 2013 (**Table 4**).

Figure 23. Proportion of All Children Aged 0–17 Years Who Were Reliant on a Benefit Recipient by Benefit Type, New Zealand June 2000–2013

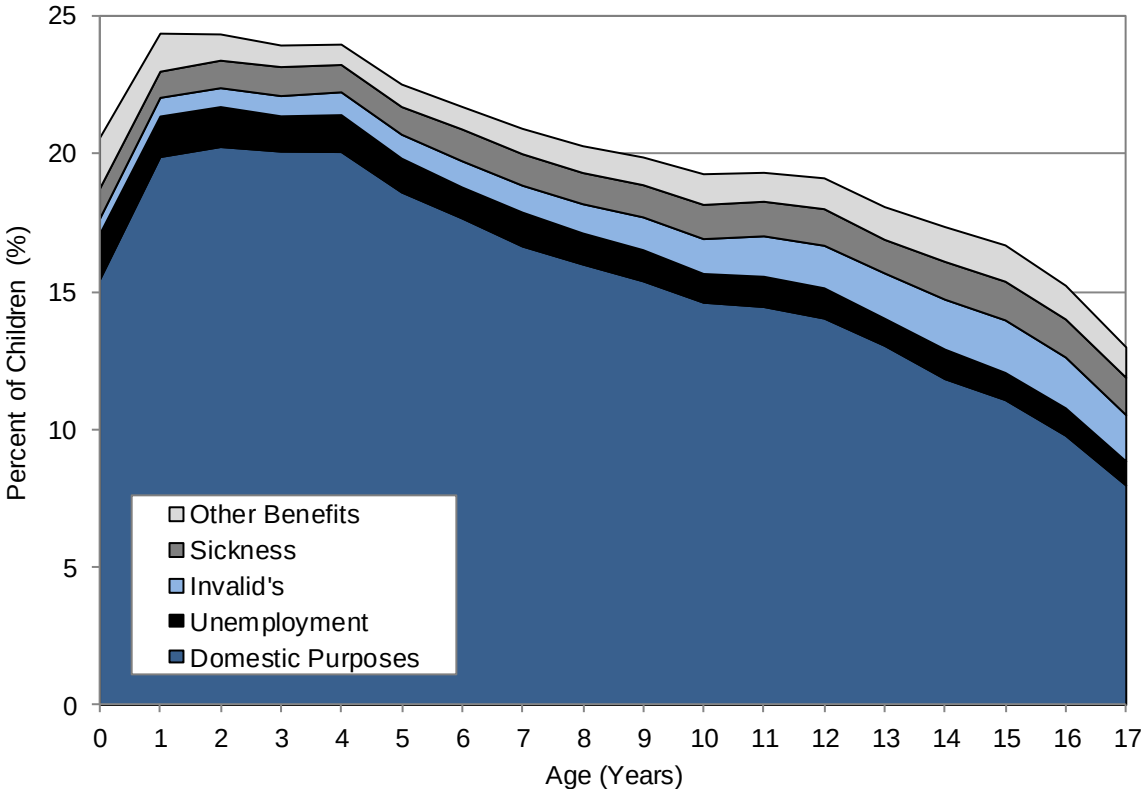


Source: Numerator: MSD SWIFTT Database; Denominator: Statistics NZ Estimated Resident Population; Note: For composition of “Other Benefits” see Data Source and Methods box above.

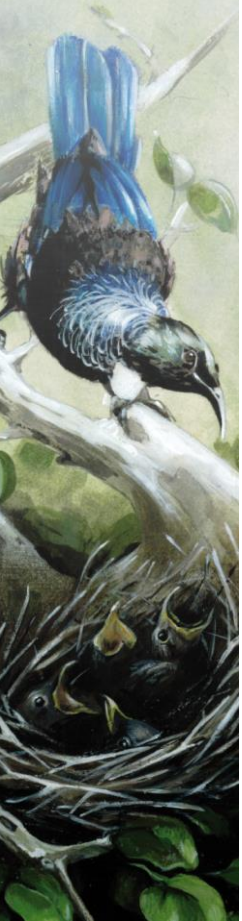
Distribution by Age

At the end of June 2013, the proportion of children reliant on a benefit recipient was highest in those 1–4 years. Rates then tapered off gradually during middle to late childhood, and then more steeply after 12 years of age (**Figure 24**).

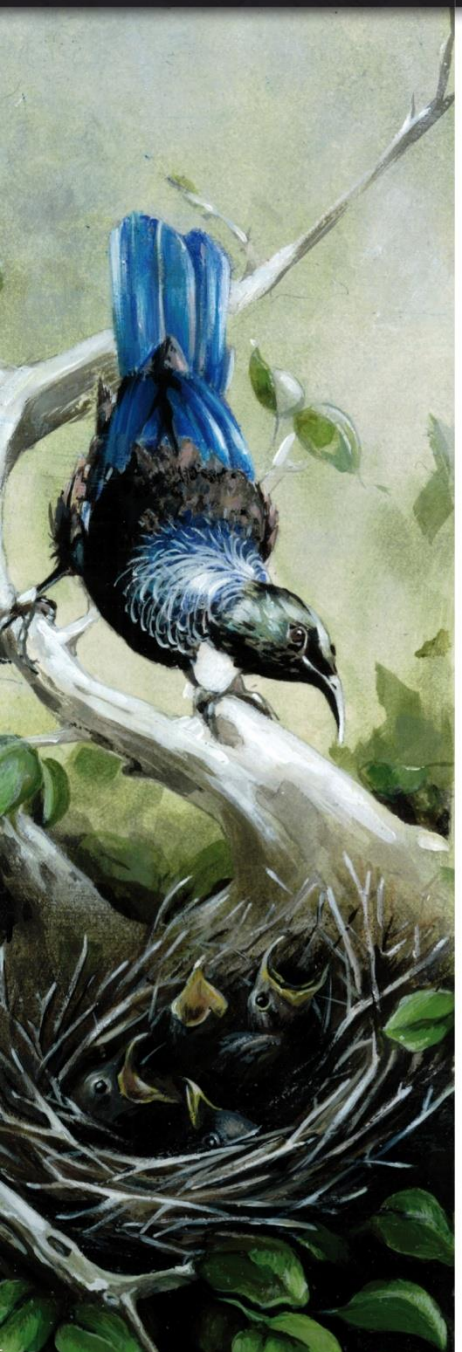
Figure 24. Proportion of All Children Aged 0–17 Years who were Reliant on a Benefit Recipient by Age and Benefit Type, New Zealand June 2013



Source: Numerator: MSD SWIFTT Database; Denominator: Statistics NZ Estimated Resident Population; Note: For composition of "Other Benefits" see Methods Section



HEALTH AND WELLBEING INDICATORS



HEALTH AND WELLBEING INDICATORS: INTRODUCTION

Introduction

In New Zealand, there are currently large disparities in child health status, with Māori and Pacific children and those living in more deprived areas experiencing a disproportionate burden of morbidity and mortality [31]. Such disparities reflect trends in child poverty rates, and the macroeconomic environment (including the official recession which ran from June 2008 to June 2009), as well as a range of historical and policy factors going back over many years.

Children growing up in low income households face multiple health risks. The health outcomes associated with childhood poverty are wide-ranging and well documented in the international and New Zealand health science literature [5].

Some of the negative health outcomes statistically associated with childhood poverty include: low birth weight; infant mortality and Sudden Unexpected Death in Infancy (SUDI); poorer mental health and cognitive development; and higher rates of hospital admissions for infectious and respiratory diseases, which are often associated with living in crowded household conditions [31]. Children who grow up in poverty are also more likely to have poorer health outcomes in adulthood, such as heart disease and addictions [5].

This Technical Report focuses on a number of child health outcomes which have a social gradient. These conditions were selected because they have a much higher prevalence in children living in the most socioeconomically deprived areas, and because it was thought they might respond relatively quickly (e.g. months to small number of years) to changing economic conditions (see **Appendix 1**). Monitoring such health indicators is entirely appropriate, as they are the early signs of the consequences of children living in poverty.

Over time, we will look to include additional indicators of child poverty, related to issues such as education, housing, social inclusion, disability and quality of life.

HOSPITAL ADMISSIONS AND MORTALITY WITH A SOCIAL GRADIENT

Introduction

Many hospital admissions in children are for conditions that have a social gradient. That is, they are known to be sensitive to socioeconomic conditions, with much higher rates, or worse outcomes being seen in children from the most socioeconomically deprived areas. The majority of these conditions are infectious and respiratory diseases, where the links between poverty and adverse outcomes are relatively well understood (e.g. living in poverty often means living in cold, damp houses and economising on trips to doctor or filling prescriptions [8]). There are a number of other medical conditions and injuries with a social gradient however, where the relationship to poverty is less straight forward, but still real [32].

Notes on Changes to the Hospital Admissions and Mortality with Social Gradient Indicator

A number of changes have been made to this indicator (vs. the previous Children's Social Health Monitor), to ensure that the Technical Report remains congruent with evolving clinical practice and the coding conventions of other Government Agencies. Further the data constraints imposed by the cancellation of the 2011 Census have also influenced the current indicator's scope.

Specifically the changes to this indicator include:

1. *The broadening of Asthma to Asthma and Wheeze*: In recent years there has been a move away from diagnosing asthma in pre-school age children, with the majority of a European Respiratory Society Taskforce in 2008 "*agreeing not to use the term asthma to describe preschool wheezing illness, since there is insufficient evidence to show that the pathophysiology of preschool wheezing illness is similar to that of asthma in older children [33]".* Since then, New Zealand has seen large increases in the number of preschool age children admitted to hospital with a primary diagnosis of wheeze (R062), with a corresponding fall in the number admitted with asthma (J45–J46) (see **Appendix 2** for further detail). Thus, in this year's indicator, Asthma (J45–J46) has been replaced with a new category, Asthma and Wheeze (J45–J46, R062), in order to minimise the impacts of this probable diagnostic shift on time series analysis.

   The addition of J22 (Unspecified Lower Respiratory Infections): J22 was not initially included in the CSHM's coding algorithms, as it was not present in ICD-9, and thus could not be included in time series analyses prior to 2000. However, given the significant potential for diagnostic overlap between J18.9 (Unspecified Pneumonia) and J22 (Unspecified Lower Respiratory Tract Infections), and the current focus on trends since 2000, J22 has been added to the Technical Report's coding algorithms for this year's update (see **Appendix 2** for further detail).

   As a result of these changes, the rates presented in the section which follows are not directly comparable to those presented previously.

2. *A Focus on Infants Aged 29–364 Days:* With the cancellation of the 2011 Census, Statistics New Zealand's population projections (0–14 years) have been used as a denominator in all rate calculations. With population projections being unavailable by NZDep Index decile, the reporting of rates by NZDep is not currently possible for the 0–14 year age group. Further, it is possible that the rates presented may change in future editions once more reliable denominator information becomes available.

   The Birth Registration dataset however, does provide a reliable annual update on the number of babies born into each NZDep decile. This year's update thus includes a section which explores social gradients in hospital admissions for a variety of medical

conditions in babies aged 29–364 days, with a view to assessing how babies aged under one year are faring in the current economic climate.

3. *Aligning of the Monitor's SUDI Coding with the Child and Youth Mortality Review Committee (CYMRC):* In 2013 [34], the CYMRC recommended that a common set of ICD-10-AM codes be adopted for Sudden Unexpected Death in Infancy (SUDI) reporting across the health sector[1]. While the majority of these codes were already included in the Monitor's coding algorithms, two (W78: Inhalation of Gastric Contents; and W79: Inhalation and Ingestion of Food Causing Obstruction of the Respiratory Tract) were not. The addition of these two codes resulted in the inclusion of three additional deaths in the 2006–2010 period.

Data Source and Methods

Definition

1. Hospital admissions for medical conditions and injuries with a social gradient in children aged 0–14 years

2. Mortality from medical conditions and injuries with a social gradient and SUDI in children aged 0–14 years

3. Hospital admissions for medical conditions and injuries with a social gradient in infants aged 29–364 days

Data Source

Numerator:

Hospital Admissions for Medical Conditions with a Social Gradient: Acute and arranged (arranged = within 7 days of referral) hospital admissions (waiting list cases and neonates <29 days excluded) with the following ICD-10-AM primary diagnoses: A00–A09, R11, K529 (Gastroenteritis); A15–A19 (Tuberculosis); A33, A34, A35, A36, A37, A80, B05, B06, B16, B26, B18.0, B18.1, P35.0 or M01.4 (Vaccine Preventable Diseases); A39 (Meningococcal Disease); B34 (Viral Infection of Unspecified Site); E40–E64 or D50–D53 (Nutritional Deficiencies/Anaemias); J00–J03 orJ06 (Acute Upper Respiratory Infections); J04 (Croup/Laryngitis/Tracheitis/ Epiglottitis); J12, J10.0 or J11.0 (Viral Pneumonia); J13–J16 or J18 (Bacterial/Non-Viral/Unspecified Pneumonia); J21 (Acute Bronchiolitis); J22 (Acute Lower Respiratory Infection Unspecified); J45–J46, R062 (Asthma and Wheeze); J47 (Bronchiectasis); G00–G01 (Bacterial Meningitis); A87, G02 or G03 (Viral/Other/NOS Meningitis); G40 or G41 (Epilepsy/Status Epilepticus); H65, H66 or H67 (Otitis Media); I00–I09 (Rheumatic Fever/Heart Disease); K40 (Inguinal Hernia); L00–L08, H00.0, H01.0, J34.0 or L98.0 (Skin Infections); L20–L30 (Dermatitis and Eczema); M86 (Osteomyelitis); N10, N12, N13.6, N30.0, N30.9 or N39.0 (Urinary Tract Infection); R56.0 (Febrile Convulsions).

Injury Admissions with a Social Gradient: Hospital admissions (emergency department cases, neonates <29 days excluded) with a primary diagnosis of injury (ICD-10-AM S00–T79) and an ICD-10-AM primary external cause code in the following range: V01–V09 (Transport: Pedestrian); V10–V19 (Transport: Cyclist); V40–V79 (Transport: Vehicle Occupant); W00–W19 (Falls); W20–W49 (Mechanical Forces: Inanimate); W50–W64 (Mechanical Forces: Animate); W85–X19 (Electricity/Fire/Burns); X40–X49 (Accidental Poisoning). In order to ensure comparability over time, all injury cases with an Emergency Department Specialty Code (M05–M08) on discharge were excluded.

Mortality from conditions with a social gradient: All deaths (neonates <29 days excluded) with a main underlying cause of death in the ICD-10-AM medical and injury categories outlined above. In addition, post-neonatal Sudden Unexpected Deaths in Infancy (SUDI) were included if the child was aged between 29 days and 1 year and their main underlying cause of death was SUDI (R95, R96, R98, R99, W75, W78, W79).

Denominator:

Children aged 0–14 years: NZ Statistics NZ Estimated Resident Population (projected from 2007)

Infants aged 29–364 days: Birth Registration Dataset

Notes on Interpretation

Note 1: Hospital admissions in neonates (<29 days) were excluded from both indicators. These admissions are more likely to reflect issues arising prior to/at the time of birth (e.g. preterm infants may register multiple admissions as they transition from neonatal intensive care (NICU), through special care baby units (SCBU) to the postnatal ward) and respiratory infections and/or other medical conditions arising in these contexts are likely to differ in their aetiology from those arising in the community.

Note 2: For medical conditions, only acute and arranged admissions have been included, as waiting list admissions tend to reflect service capacity rather than actual health need (e.g. inclusion of these admissions would result in a large number of children with otitis media with effusion (OME) and chronic tonsillitis being included (for grommets and tonsillectomies), whose demographic profile is very different from children

[1] R95 (Sudden Infant Death Syndrome), R96 (Other Sudden Death, Cause Unknown), R98 (Unattended Death), R99 (Other Ill-Defined and Unspecified Causes of Mortality), W75 (Accidental Suffocation and Strangulation in Bed), W78 (Inhalation of Gastric Contents) and W79 (Inhalation and Ingestion of Food Causing Obstruction of the Respiratory Tract)

attending hospital acutely for similar diseases). For injury admissions, however, filtering by admission type was not undertaken. All injury cases with an Emergency Department Specialty Code (M05–M08) on discharge were excluded however (see **Appendix 4** for rationale).

Note 3: Hospital admissions were considered to have a social gradient if rates for those in the most deprived (NZDep deciles 9–10) areas were ≥1.8 times higher than for those in the least deprived (NZDep deciles 1–2) areas, or where rates for Māori, Pacific or Asian/Indian children were ≥1.8 times higher than for European children. In addition, a small number of conditions were included where rates were ≥1.5 times higher, they demonstrated a consistent social gradient, and the association was biologically plausible.

Note 4: When considering differences in the magnitude of social gradients between medical and injury admissions it must be remembered that these rates are not strictly comparable, as for technical reasons, Emergency Department (ED) cases have been removed from injury admissions (and social differences in attendance at the ED vs. primary care for minor medical conditions may have accounted for some (but not all) of the social gradients in medical admission seen). No such differential filtering was applied to mortality data, however, and thus the magnitude of the social differences seen in mortality data is more readily comparable.

Note 5: SUDI rates are traditionally calculated per 1,000 live births. For this analysis rates for those aged 0–14 years have been calculated, so that the relative contribution SUDI makes to mortality in this age group (as compared to other causes of death) is more readily appreciated. As a result, the SUDI rates in this section are not readily comparable to traditional SUDI mortality rates for those <1 year reported elsewhere.

For details of the methodology used to derive these indicators see **Appendix 1**

Distribution and Trends in Children 0–14 Years

New Zealand Distribution by Cause

Hospital Admissions: In New Zealand during 2008–2012, asthma and wheeze, bronchiolitis and gastroenteritis, made the largest individual contributions to hospitalisations for medical conditions with a social gradient, although infectious and respiratory diseases collectively were responsible for the majority of admissions. Similarly, falls, followed by inanimate mechanical forces were the leading causes of injury admissions with a social gradient, although transport injuries as a group also made a significant contribution (**Table 5**).

Mortality: In New Zealand during 2006–2010, SUDI made the single largest contribution to mortality with a social gradient in children aged 0–14 years. This occurred despite the fact that, by definition, all of these deaths occurred during the first year of life. Vehicle occupant deaths made the largest contribution to injury-related deaths, followed by pedestrian injuries and drowning/submersion, while bacterial/non-viral/unspecified pneumonia was the leading cause of mortality from medical conditions (**Table 6**).

New Zealand Trends

Hospital Admissions: In New Zealand, medical admissions with a social gradient increased during the early 2000s, reached a peak in 2002, and then declined, with an upswing in rates again being evident during 2007–2012. In contrast, injury admissions with a social gradient declined throughout 2000–2012 (**Figure 25**). Note: The exclusion of Emergency Department cases from injury admissions may have been partly responsible for these diverging trends.

Note: Inconsistencies in DHB reporting of Emergency Department (ED) cases to the National Minimum Dataset may have affected trends in admissions for medical conditions with a social gradient. Many DHBs were reporting their ED cases from the early 2000s, and **Figure 26** shows the increase in admissions in the DHBs who changed their reporting practice from 2009 when the Ministry made reporting of ED day cases mandatory. While the increase in numbers is modest, some, but not all, of the increase in admissions seen during this period may be due to these changes. See **Appendix 4** for further details.

Mortality: In New Zealand, mortality from injuries with a social gradient decreased between 2000 and 2004, but fluctuated thereafter. Similarly, post-neonatal SUDI decreased between 2000 and 2002 and thereafter remained relatively static, while mortality from medical conditions with a social gradient fluctuated throughout 2000–2010 (**Figure 25**).

Table 5. Hospital Admissions for Conditions with a Social Gradient in Children Aged 0–14 Years (Excluding Neonates) by Primary Diagnosis, New Zealand 2008–2012

Primary Diagnosis	New Zealand Children Aged 0–14 Years			
	Number: Total 2008−2012	Number: Annual Average	Rate per 1,000	% of Total
Medical Conditions				
Asthma and Wheeze	30,224	6,044.8	6.78	15.1
Bronchiolitis	29,194	5,838.8	6.55	14.6
Gastroenteritis	26,985	5,397.0	6.05	13.5
Acute Upper Respiratory Infections	20,632	4,126.4	4.63	10.3
Viral Infection of Unspecified Site	19,987	3,997.4	4.48	10.0
Skin Infections	16,141	3,228.2	3.62	8.1
Pneumonia: Bacterial, Non-Viral, Unspecified	14,055	2,811.0	3.15	7.0
Urinary Tract Infection	7,145	1,429.0	1.60	3.6
Acute Lower Respiratory Infection Unspecified	6,736	1,347.2	1.51	3.4
Croup/Laryngitis/Tracheitis/Epiglottitis	6,054	1,210.8	1.36	3.0
Epilepsy/Status Epilepticus	4,302	860.4	0.96	2.1
Dermatitis and Eczema	3,511	702.2	0.79	1.8
Febrile Convulsions	3,409	681.8	0.76	1.7
Otitis Media	3,023	604.6	0.68	1.5
Pneumonia: Viral	2,216	443.2	0.50	1.1
Inguinal Hernia	1,270	254.0	0.28	0.6
Osteomyelitis	1,165	233.0	0.26	0.6
Rheumatic Fever/Heart Disease	987	197.4	0.22	0.5
Vaccine Preventable Diseases	806	161.2	0.18	0.4
Meningitis: Viral/Other/NOS	765	153.0	0.17	0.4
Bronchiectasis	687	137.4	0.15	0.3
Meningococcal Disease	401	80.2	0.09	0.2
Nutritional Deficiencies/Anaemias	301	60.2	0.07	0.2
Meningitis: Bacterial	204	40.8	0.05	0.1
Tuberculosis	52	10.4	0.01	<0.1
New Zealand Total	200,252	40,050.4	44.90	100.0
Injury Admissions				
Falls	23,389	4,677.8	5.24	49.4
Mechanical Forces: Inanimate	12,422	2,484.4	2.79	26.3
Mechanical Forces: Animate	2,883	576.6	0.65	6.1
Transport: Cyclist	2,434	486.8	0.55	5.1
Accidental Poisoning	2,166	433.2	0.49	4.6
Electricity/Fire/Burns	2,035	407.0	0.46	4.3
Transport: Vehicle Occupant	975	195.0	0.22	2.1
Transport: Pedestrian	847	169.4	0.19	1.8
Drowning/Submersion	168	33.6	0.04	0.4
New Zealand Total	47,319	9,463.8	10.61	100.0

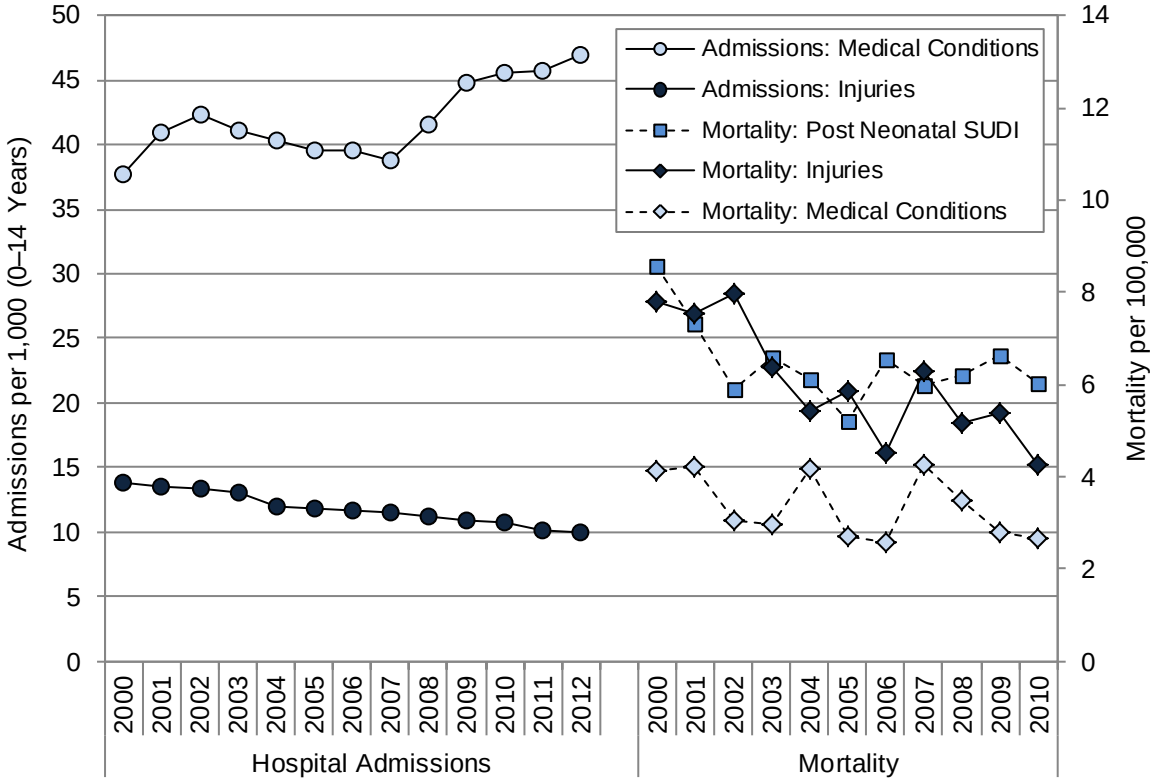
Source: Numerator: National Minimum Dataset (neonates removed); Denominator: Statistics NZ Estimated Resident Population (projected from 2007); Note: Medical Conditions: Acute and arranged admissions only; Injury Admissions: Emergency Department Cases Excluded

Table 6. Mortality from Conditions with a Social Gradient in Children Aged 0–14 Years (Excluding Neonates) by Main Underlying Cause of Death, New Zealand 2006–2010

Cause of Death	New Zealand Children Aged 0–14 Years			
	Number: Total 2006−2010	Number: Annual Average	Rate per 100,000	Percent of Category
Medical Conditions				
Pneumonia: Bacterial, Non-Viral, Unspecified	38	7.6	0.85	27.0
Epilepsy/Status Epilepticus	20	4.0	0.45	14.2
Meningococcal Disease	19	3.8	0.43	13.5
Asthma and Wheeze	15	3.0	0.34	10.6
Pneumonia: Viral	13	2.6	0.29	9.2
Gastroenteritis	9	1.8	0.20	6.4
Acute Bronchiolitis	5	1.0	0.11	3.5
Bronchiectasis	3	0.6	0.07	2.1
Meningitis: Bacterial	3	0.6	0.07	2.1
Other Conditions	16	3.2	0.36	11.3
Total Medical Conditions	141	28.2	3.17	100.0
Injuries				
Transport: Vehicle Occupant	83	16.6	1.87	36.4
Transport: Pedestrian	42	8.4	0.94	18.4
Drowning/Submersion	41	8.2	0.92	18.0
Electricity/Fire/Burns	18	3.6	0.40	7.9
Mechanical Forces: Inanimate	13	2.6	0.29	5.7
Transport: Cyclist	12	2.4	0.27	5.3
Falls	10	2.0	0.22	4.4
Accidental Poisoning	9	1.8	0.20	3.9
Total Injuries	228	45.6	5.13	100.0
Post Neonatal SUDI				
Post Neonatal SUDI	279	55.8	6.27	100.0
New Zealand Total Mortality	648	129.6	14.57	100.0

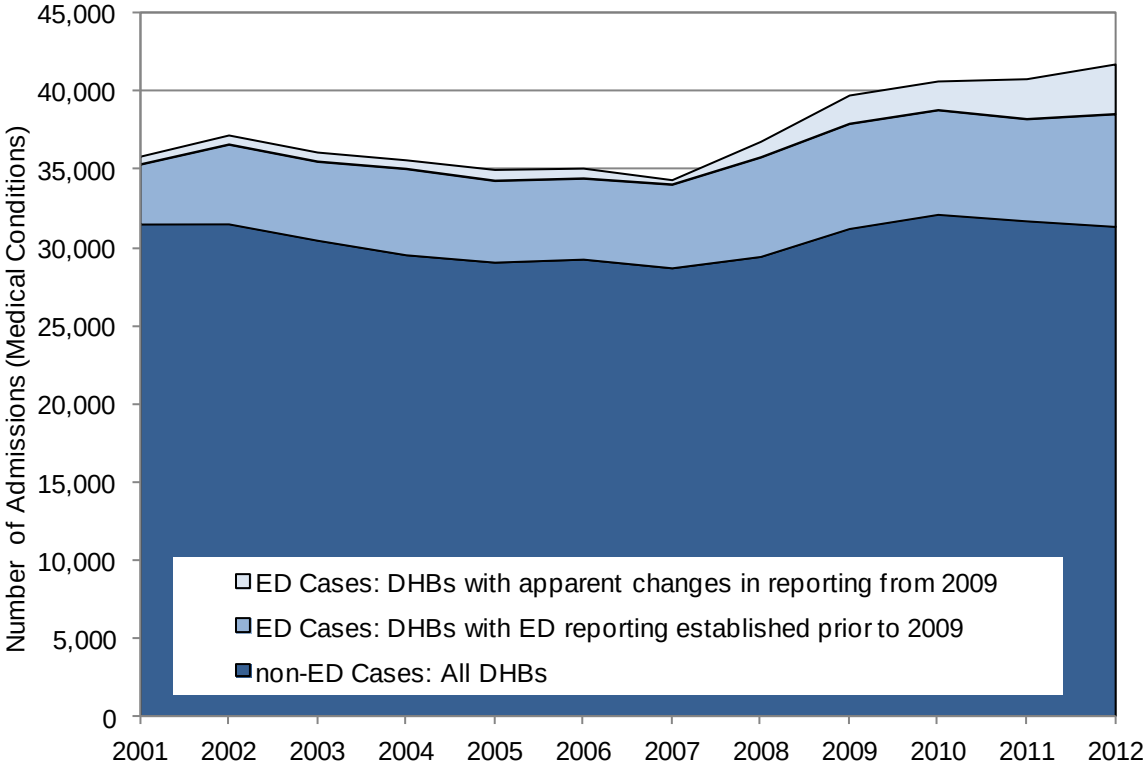
Source: Numerator: National Mortality Collection (neonates removed); Denominator: Statistics NZ Estimated Resident Population (projected from 2007); Note: SUDI numerators are for infants aged 29–364 days only

Figure 25. Hospital Admissions (2000–2012) and Mortality (2000–2010) from Conditions with a Social Gradient in New Zealand Children Aged 0–14 Years (Excluding Neonates)



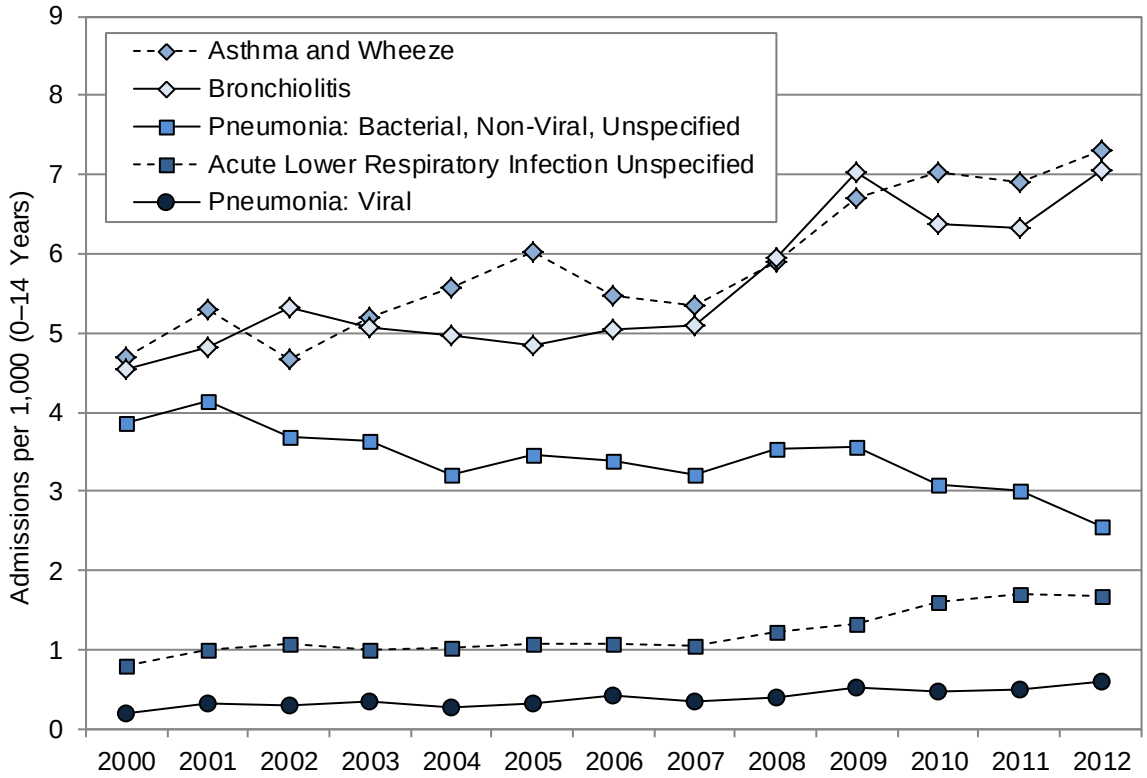
Source: Numerator Admissions: National Minimum Dataset; Numerator Mortality: National Mortality Collection Denominator: Statistics NZ Estimated Resident Population (projected from 2007) Note: Medical Conditions Admissions: Acute and arranged admissions only; Injury Admissions: Emergency Department Cases Excluded

Figure 26. Hospital Admissions for Medical Conditions with a Social Gradient in Children Aged 0–14 Years by Health Specialty on Discharge and DHB Reporting Practice, New Zealand 2000–2012



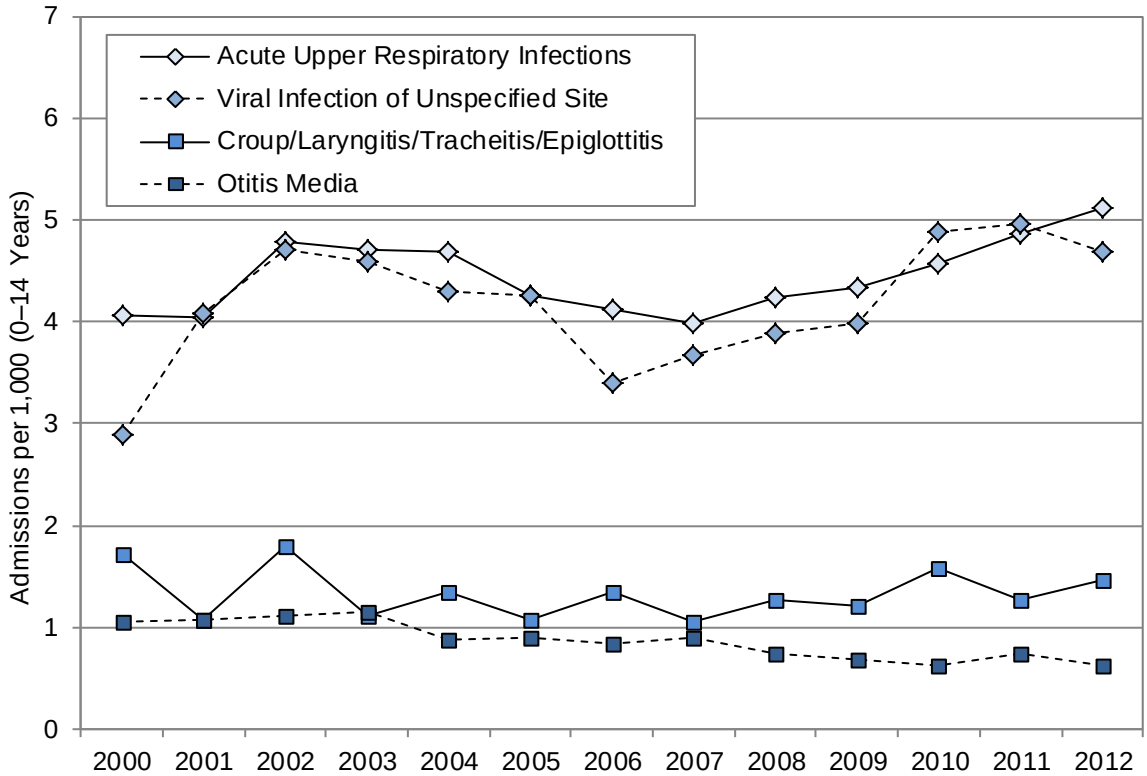
Source: National Minimum Dataset, Acute and Arranged Admissions only; Note: ED cases are those with a health speciality code on discharge of M05–M08

Figure 27. Hospital Admissions for Lower Respiratory Conditions with a Social Gradient in Children Aged 0–14 Years (Excluding Neonates), New Zealand 2000–2012



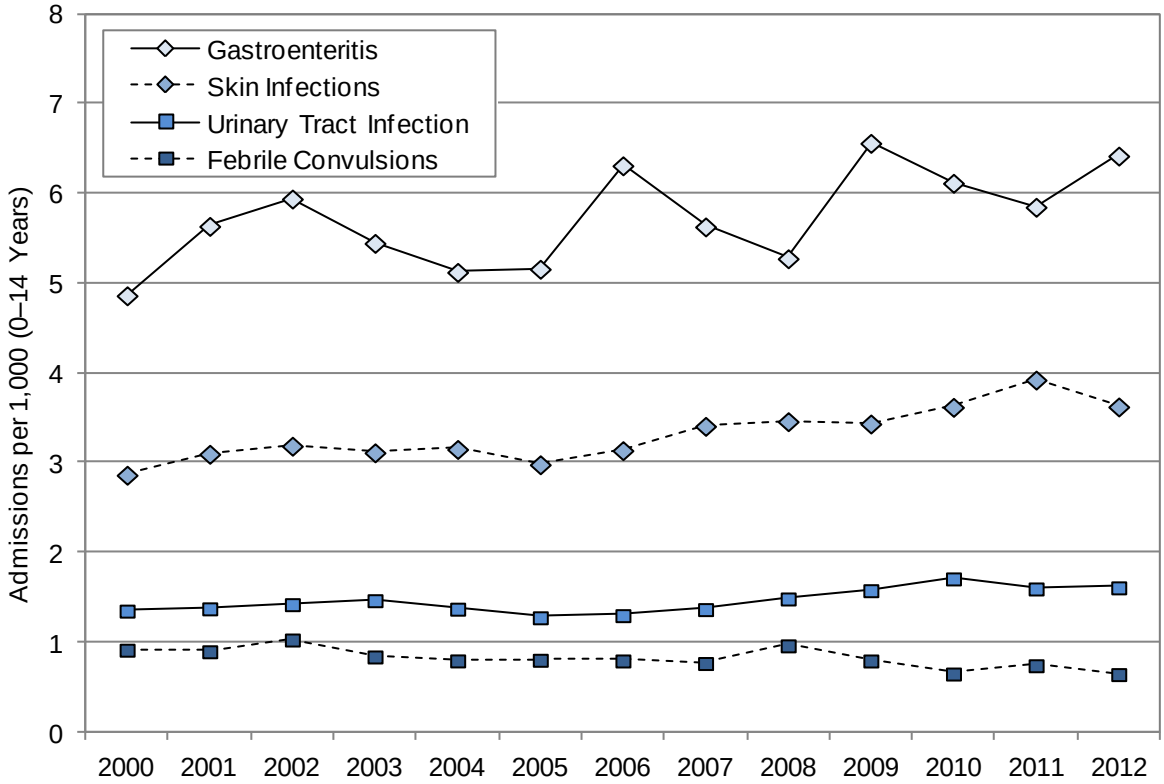
Source: Numerator: National Minimum Dataset; Denominator: Statistics NZ Estimated Resident Population (projected from 2007); Note: Acute and arranged admissions only

Figure 28. Hospital Admissions for Acute Upper Respiratory Tract Infections and Unspecified Viral Infections in Children Aged 0–14 Years (Excluding Neonates), New Zealand 2000–2012



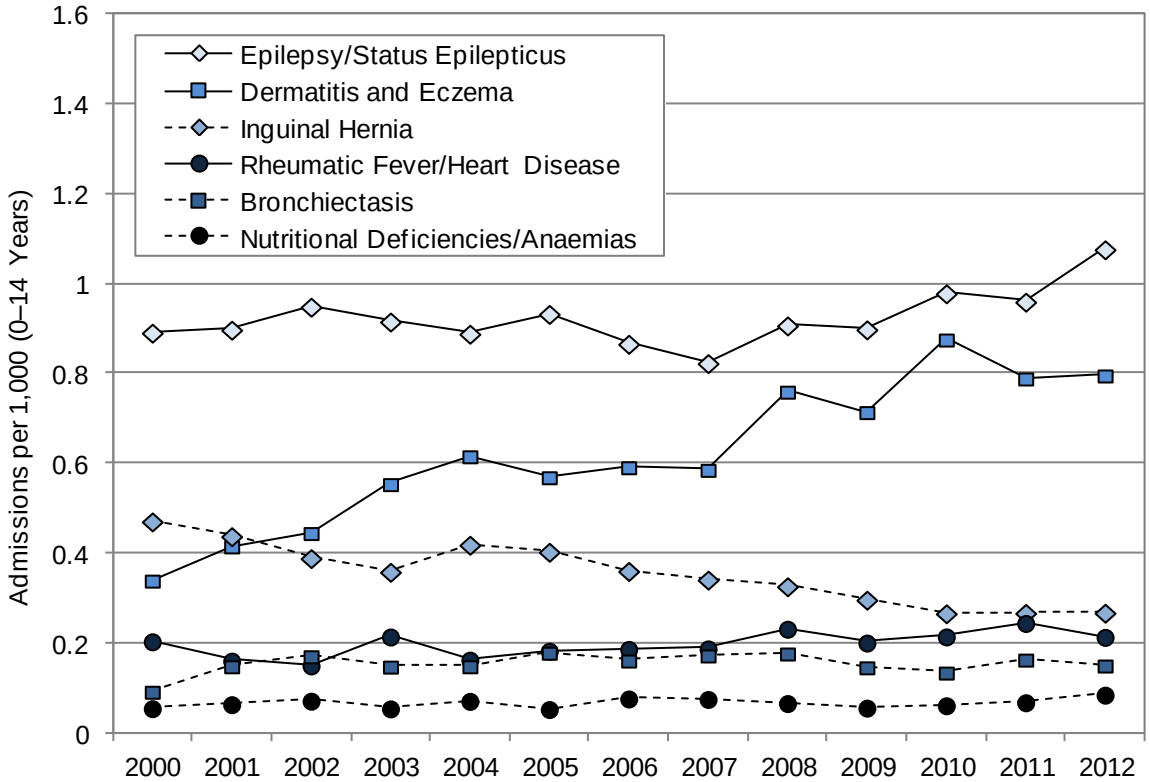
Source: Numerator: National Minimum Dataset; Denominator: Statistics NZ Estimated Resident Population (projected from 2007); Note: Acute and arranged admissions only

Figure 29. Hospital Admissions for Selected Acute Medical Conditions with a Social Gradient in Children Aged 0–14 Years (Excluding Neonates), New Zealand 2000–2012



Source: Numerator: National Minimum Dataset; Denominator: Statistics NZ Estimated Resident Population (projected from 2007); Note: Acute and arranged admissions only

Figure 30. Hospital Admissions for Selected Chronic Medical Conditions with a Social Gradient in Children Aged 0–14 Years (Excluding Neonates), New Zealand 2000–2012



Source: Numerator: National Minimum Dataset; Denominator: Statistics NZ Estimated Resident Population (projected from 2007); Note: Acute and arranged admissions only

Trends by Primary Diagnosis

Lower Respiratory Conditions: During 2000–2012, hospital admissions for bronchiolitis and asthma and wheeze increased in children aged 0–14 years, as did admissions for viral pneumonia. While admissions for bacterial/non-viral/unspecified pneumonia declined during this period, this was offset by an increase in admissions for unspecified acute lower respiratory infections during 2007–2012 (**Figure 27**).

Upper Respiratory Tract and Unspecified Viral Infections: While trends in admissions for acute upper respiratory infections and viral infections of unspecified site were variable during the early to mid 2000s, both exhibited a general upward trend during 2007–2012. Admissions for croup/laryngitis/tracheitis/epiglottitis however, were more static, while admissions for otitis media declined after 2007 (**Figure 28**).

Other Medical Conditions: During 2000–2012, hospital admissions for gastroenteritis, skin infections, dermatitis and eczema, and urinary tract infections in children aged 0–14 years all exhibited a general upward trend, while admissions for inguinal hernias declined. Trends for a number of other conditions were more variable (**Figure 29**, **Figure 30**).

Hospital Admission Trends by Ethnicity

Medical Conditions: During 2000–2012, hospitalisations for medical conditions with a social gradient were consistently higher for Pacific > Māori > European/Other and Asian/Indian children. For Pacific children, admissions increased during the early 2000s, reached a peak in 2003 and then declined. An upswing in rates was again evident during 2007–2009. For Māori children, rates were static during the mid-2000s, but then increased during 2007–2009, while for European/Other and Asian/Indian children rates were static during the mid-2000s but increased during 2007–2012 (**Figure 31**).

Injuries: During 2000–2012, injury admissions with a social gradient were also higher for Pacific and Māori > European/Other > Asian/Indian children. While admission rates declined for Pacific, Māori and European/Other children during 2000–2012, the rate of decline was faster for European/Other, followed by Māori children. Thus ethnic differences were greater in 2012 than they were in 2000. Trends for Asian/Indian children however, were more variable (**Figure 31**).

Mortality Trends by Ethnicity

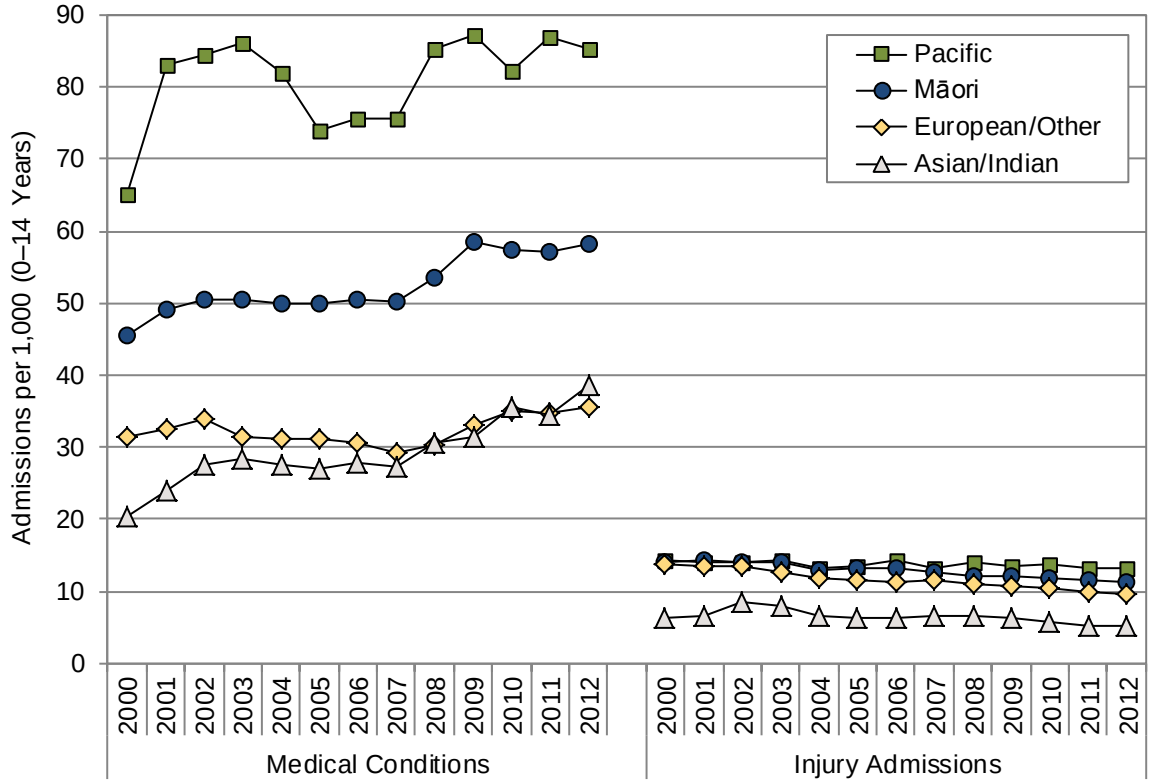
During 2000–2010, SUDI mortality was consistently higher for Māori > Pacific > European/Other and Asian/Indian infants, while mortality from medical conditions with a social gradient was generally higher for Māori and Pacific children than for European/Other and Asian/Indian children. Mortality from injuries with a social gradient was higher for Māori children than for Pacific, European/Other and Asian/Indian children (**Figure 32**).

Distribution of Hospital Admissions by Ethnicity and Gender

Medical Conditions: During 2008–2012, hospital admissions for medical conditions with a social gradient were *significantly* higher for Pacific > Māori > European/Other and Asian/Indian children. Admissions were also *significantly* higher for males (**Table 7**).

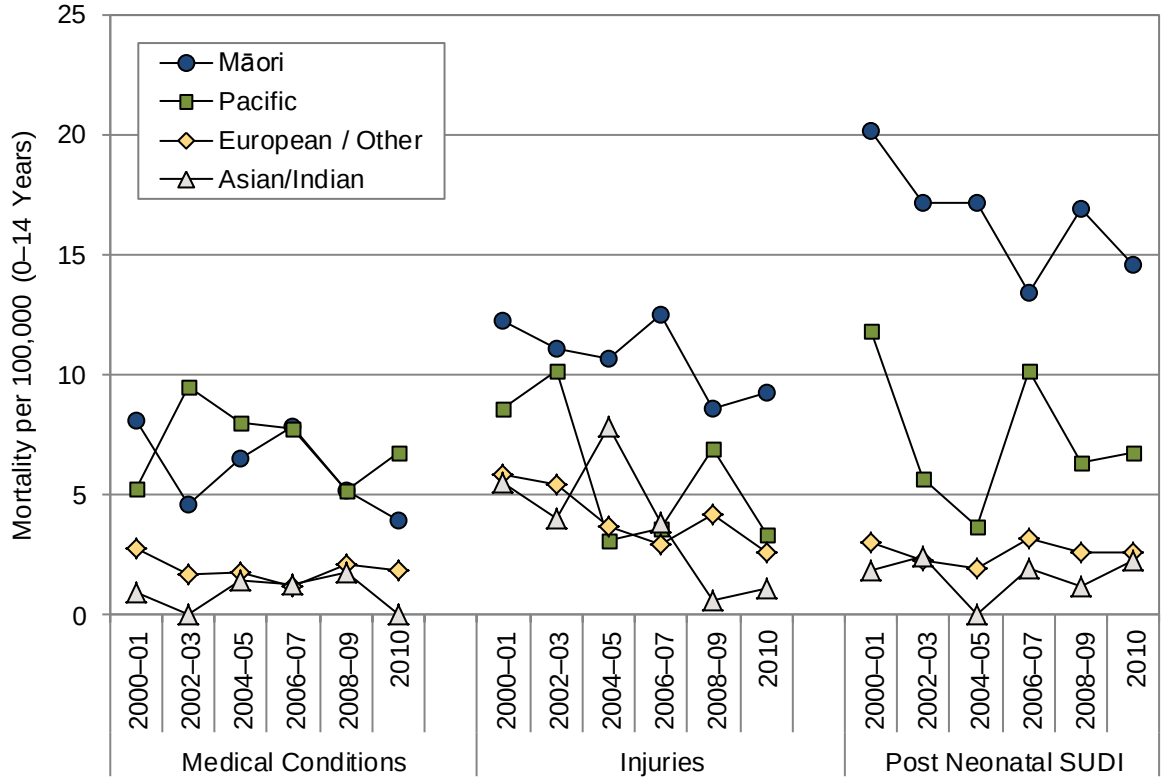
Injuries: Similarly during 2008–2012, hospital admissions for injuries with a social gradient were *significantly* higher for Pacific > Māori > European/Other > Asian/Indian children. Admissions were also *significantly* higher for males. While the magnitude of these social differences appeared smaller for injury admissions than for medical admissions, it must be remembered that that for technical reasons (See **Note 4** in Methods Section) these categories are not strictly comparable (**Table 7**).

Figure 31. Hospital Admissions for Conditions with a Social Gradient in Children Aged 0–14 Years (Excluding Neonates) by Ethnicity, New Zealand 2000–2012



Source: Numerator: National Minimum Dataset (neonates removed); Denominator: Statistics NZ Estimated Resident Population (projected from 2007); Note: Medical Conditions: Acute and arranged admissions only; Injury Admissions: Emergency Department Cases Excluded; Ethnicity is Level 1 Prioritised

Figure 32. Mortality from Conditions with a Social Gradient in Children Aged 0–14 Years (Excluding Neonates) by Ethnicity, New Zealand 2000–2010



Source: Numerator: National Mortality Collection (neonates removed); Denominator: Statistics NZ Estimated Resident Population (projected from 2007); Note: SUDI deaths are for infants aged 29–364 days only; Ethnicity is Level 1 Prioritised

Table 7. Distribution of Hospital Admissions with a Social Gradient in Children Aged 0–14 Years (Excluding Neonates) by Ethnicity and Gender, New Zealand 2008–2012

Hospital Admissions in Children 0–14 Years							
Medical Conditions							
Variable	Rate	RR	95% CI	Variable	Rate	RR	95% CI
Asian/Indian	34.33	1.02	1.00–1.04	Female	40.29	1.00	
European/Other	33.72	1.00		Male	49.28	1.22	1.21–1.23
Māori	56.99	1.69	1.67–1.71				
Pacific	85.37	2.53	2.50–2.56				
Injuries							
Variable	Rate	RR	95% CI	Variable	Rate	RR	95% CI
Asian/Indian	5.75	0.56	0.53–0.58	Female	8.57	1.00	
European/Other	10.36	1.00		Male	12.55	1.46	1.44–1.49
Māori	11.76	1.14	1.11–1.16				
Pacific	13.42	1.30	1.26–1.33				

Source: Numerator: National Minimum Dataset (neonates removed); Denominator: Statistics NZ Estimated Resident Population (projected from 2007); Note: Medical Conditions: Acute and arranged admissions only; Injury Admissions: Emergency Department Cases Excluded; Rates are per 1,000; (RR) Rate Ratios are unadjusted; Ethnicity is Level 1 Prioritised

Distribution of Mortality by Ethnicity and Gender

During 2006–2010, mortality from medical conditions with a social gradient was *significantly* higher for Pacific and Māori children than for European/Other and Asian/Indian children. Mortality from injuries with a social gradient was *significantly* higher for Māori children than for European/Other and Asian/Indian children. Mortality was also *significantly* higher for males than for females in both categories (**Table 8**). Differences in SUDI mortality are considered in the Infant Mortality section.

Table 8. Distribution of Mortality with a Social Gradient in Children Aged 0–14 Years by Ethnicity and Gender, New Zealand 2006–2010

Mortality in Children 0–14 Years							
Medical Conditions							
Variable	Rate	Rate Ratio	95% CI	Variable	Rate	Rate Ratio	95% CI
Asian/Indian	1.22	0.73	0.29–1.84	Female	2.54	1.00	
European/Other	1.68	1.00		Male	3.77	1.49	1.06–2.09
Māori	5.99	3.58	2.43–5.27				
Pacific	6.53	3.90	2.42–6.29				
Injuries							
Variable	Rate	Rate Ratio	95% CI	Variable	Rate	Rate Ratio	95% CI
Asian/Indian	1.95	0.57	0.28–1.19	Female	3.87	1.00	
European/Other	3.39	1.00		Male	6.32	1.63	1.25–2.14
Māori	10.26	3.03	2.28–4.01				
Pacific	4.90	1.44	0.90–2.33				

Source: Numerator: National Mortality Collection (neonates removed); Denominator: Statistics NZ Estimated Resident Population (projected from 2007); Note: Rates are per 100,000; Rate Ratios are unadjusted; Ethnicity is Level 1 Prioritised

Distribution and Trends in Infants Aged 29–364 Days

New Zealand Distribution by Cause

Mortality: During 2006–2010, SUDI was the leading cause of mortality with a social gradient in infants aged 29–364 days. Bacterial/non-viral/unspecified pneumonia was the leading cause of mortality from medical conditions with a social gradient, while vehicle occupant-related injuries were the leading causes of injury mortality with a social gradient (**Table 9**).

Table 9. Mortality from Conditions with a Social Gradient in Infants Aged 29–364 Days by Main Underlying Cause of Death, New Zealand 2006–2010

Cause of Death	New Zealand Infants Aged 29–364 Days			
	Number: Total 2006−2010	Number: Annual Average	Rate per 100,000	Percent of Category
Medical Conditions				
Pneumonia: Bacterial, Non-Viral, Unspecified	28	5.6	8.79	37.3
Meningococcal Disease	9	1.8	2.82	12.0
Gastroenteritis	7	1.4	2.20	9.3
Pneumonia: Viral	7	1.4	2.20	9.3
Bronchiolitis	5	1.0	1.57	6.7
Epilepsy/Status Epilepticus	4	0.8	1.26	5.3
Other Conditions	15	3.0	4.71	20.0
Total Medical Conditions	75	15.0	23.54	100.0
Injuries				
Transport: Vehicle Occupant	7	1.4	2.20	58.3
Drowning/Submersion	4	0.8	1.26	33.3
Other Causes	<3	s	s	s
Total Injuries	12	2.4	3.77	100.0
Post Neonatal SUDI				
Post Neonatal SUDI	279	55.8	87.54	100.0
New Zealand Total Mortality	366	73.2	114.84	100.0

Source: Numerator: National Mortality Collection; Denominator: Birth Registration Dataset; s: suppressed due to small numbers

Hospital Admissions: In New Zealand, bronchiolitis was the leading cause of hospitalisations for medical conditions with a social gradient in infants aged 29–364 days, accounting for 41.6% of these admissions during 2008–2012. Gastroenteritis and acute upper respiratory infections were the second and third most frequent causes, with infectious and respiratory diseases collectively being responsible for the majority of admissions. Falls, followed by inanimate mechanical forces were the leading causes of injury admissions with a social gradient in infants aged 29–364 days (**Table 10**).

Table 10. Hospital Admissions for Conditions with a Social Gradient in Infants Aged 29–364 Days by Primary Diagnosis, New Zealand 2008–2012

Primary Diagnosis	New Zealand Infants Aged 29–364 Days			
	Number: Total 2008−2012	Number: Annual Average	Rate per 1,000	% of Total
Medical Conditions				
Bronchiolitis	25,407	5,081.4	80.02	41.6
Gastroenteritis	8,289	1,657.8	26.11	13.6
Acute Upper Respiratory Infections	6,438	1,287.6	20.28	10.5
Viral Infection of Unspecified Site	5,151	1,030.2	16.22	8.4
Urinary Tract Infection	2,735	547.0	8.61	4.5
Pneumonia: Bacterial, Non-Viral, Unspecified	2,451	490.2	7.72	4.0
Skin Infections	1,768	353.6	5.57	2.9
Acute Lower Respiratory Infection Unspecified	1,238	247.6	3.90	2.0
Croup/Laryngitis/Tracheitis/Epiglottitis	1,127	225.4	3.55	1.8
Dermatitis and Eczema	1,049	209.8	3.30	1.7
Asthma and Wheeze	965	193.0	3.04	1.6
Inguinal Hernia	901	180.2	2.84	1.5
Otitis Media	759	151.8	2.39	1.2
Pneumonia: Viral	637	127.4	2.01	1.0
Vaccine Preventable Diseases	587	117.4	1.85	1.0
Febrile Convulsions	448	89.6	1.41	0.7
Epilepsy/Status Epilepticus	444	88.8	1.40	0.7
Meningitis: Viral/Other/NOS	345	69.0	1.09	0.6
Meningococcal Disease	131	26.2	0.41	0.2
Meningitis: Bacterial	125	25.0	0.39	0.2
Nutritional Deficiencies/Anaemias	73	14.6	0.23	0.1
Osteomyelitis	51	10.2	0.16	0.1
Bronchiectasis	20	4.0	0.06	<0.1
Tuberculosis	7	1.4	0.02	<0.1
New Zealand Total	61,146	12,229.2	192.57	100.0
Injury Admissions				
Falls	771	154.2	2.43	45.9
Mechanical Forces: Inanimate	367	73.4	1.16	21.9
Electricity/Fire/Burns	290	58.0	0.91	17.3
Accidental Poisoning	110	22.0	0.35	6.6
Mechanical Forces: Animate	64	12.8	0.20	3.8
Transport: Vehicle Occupant	50	10.0	0.16	3.0
Drowning/Submersion	18	3.6	0.06	1.1
Transport: Pedestrian	8	1.6	0.03	0.5
New Zealand Total	1,678	335.6	5.28	100.0

Source: Numerator: National Minimum Dataset; Denominator: Birth Registration Dataset; Note: Medical Conditions: Acute and arranged admissions only; Injury Admissions: Emergency Department Cases Excluded

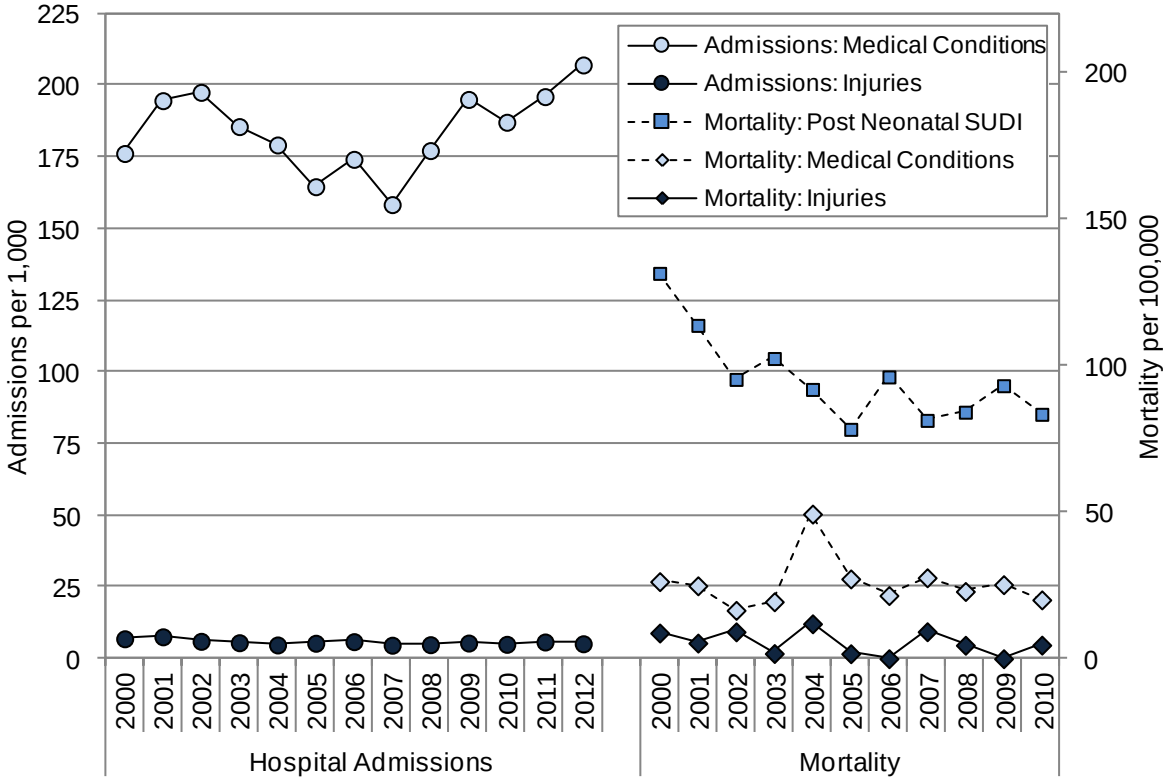
New Zealand Trends

Hospital Admissions: Medical admissions with a social gradient in infants aged 29–364 days increased during the early 2000s, reached a peak in 2002, and then declined, with an upswing in rates again being evident during 2007–2012. In contrast, injury admissions with a social gradient declined during the early 2000s, but remained relatively static during 2004–2012 (**Figure 33**). Note: The exclusion of Emergency Department cases from injury admissions may again have been partly responsible for these diverging trends.

Note: Inconsistencies in DHB reporting of Emergency Department (ED) cases to the National Minimum Dataset may have affected trends in admissions for medical conditions with a social gradient. Many DHBs were reporting their ED cases from the early 2000s, and **Figure 26** shows the increase in admissions in the DHBs who changed their reporting practice from 2009 when the Ministry made reporting of ED day cases mandatory. While the increase in numbers is modest, some, but not all, of the increase in admissions seen during this period may be due to these changes. See **Appendix 4** for further details.

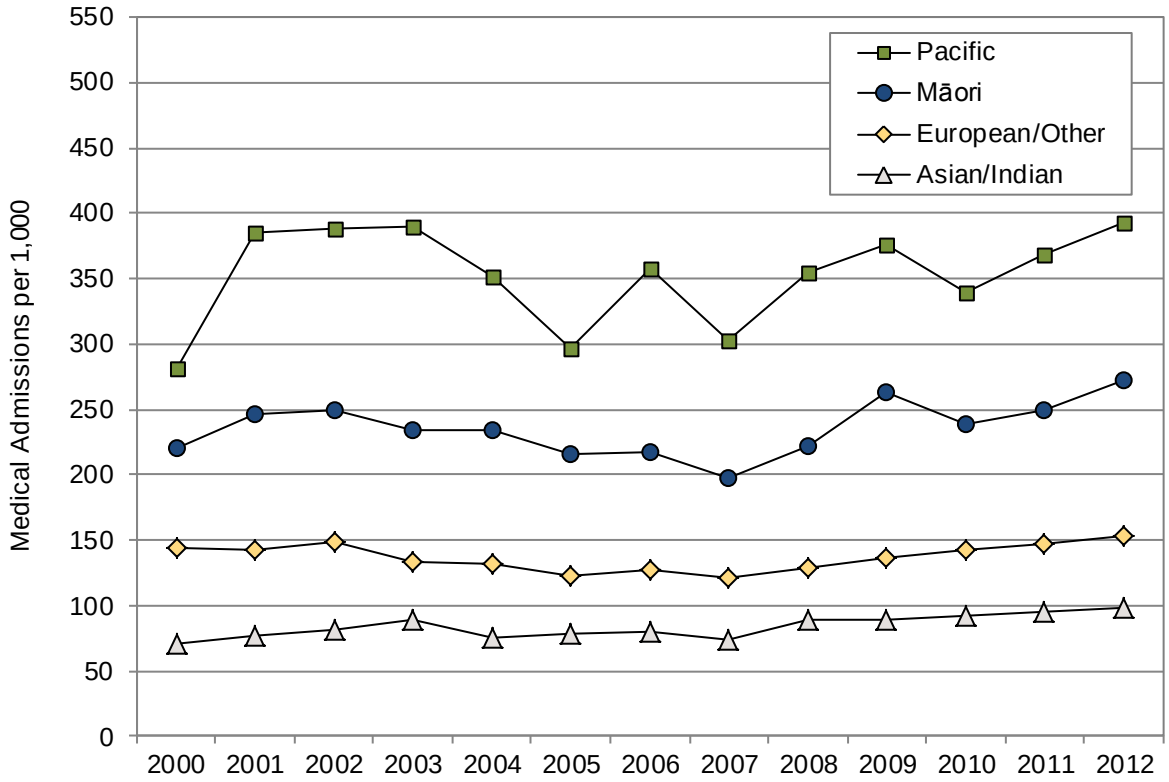
Mortality: Mortality from medical conditions and injuries with a social gradient in infants aged 29–364 days remained relatively static during 2000–2010, with mortality from medical conditions being higher than for injuries throughout this period. Post-neonatal SUDI decreased between 2000 and 2002 and thereafter remained static (**Figure 33**).

Figure 33. Hospital Admissions (2000–2012) and Mortality (2000–2010) from Conditions with a Social Gradient in New Zealand Infants Aged 29–364 Days



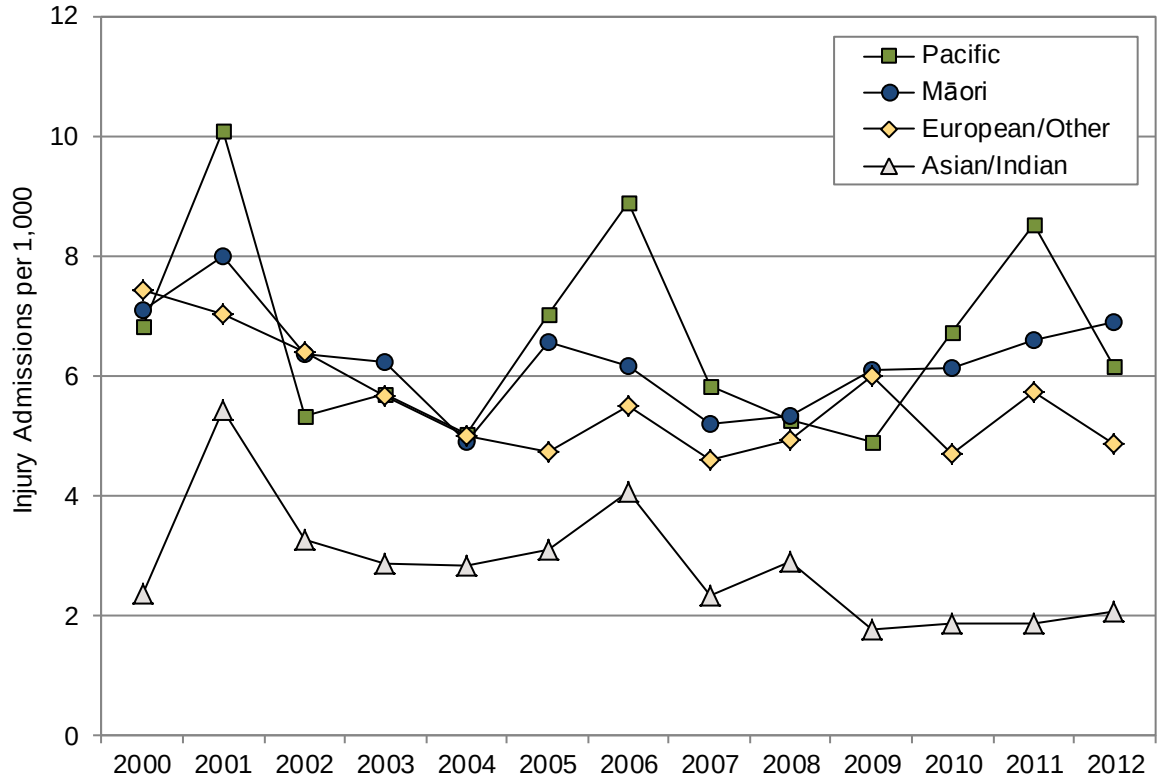
Source: Numerator Admissions: National Minimum Dataset; Numerator Mortality: National Mortality Collection; Denominator: Birth Registration Dataset; Note: Medical Conditions Admissions: Acute and arranged admissions only; Injury Admissions: Emergency Department Cases Excluded

Figure 34. Hospital Admissions for Medical Conditions with a Social Gradient in Infants Aged 29–364 Days by Ethnicity, New Zealand 2000–2012



Source: Numerator: National Minimum Dataset; Denominator: Birth Registration Dataset; Note: Acute and arranged admissions only; Ethnicity is Level 1 Prioritised

Figure 35. Hospital Admissions for Injuries with a Social Gradient in Infants Aged 29–364 Days by Ethnicity, New Zealand 2000–2012



Source: Numerator: National Minimum Dataset; Denominator: Birth Registration Dataset; Note: Emergency Department Cases Excluded; Ethnicity is Level 1 Prioritised

Admission Trends by Ethnicity

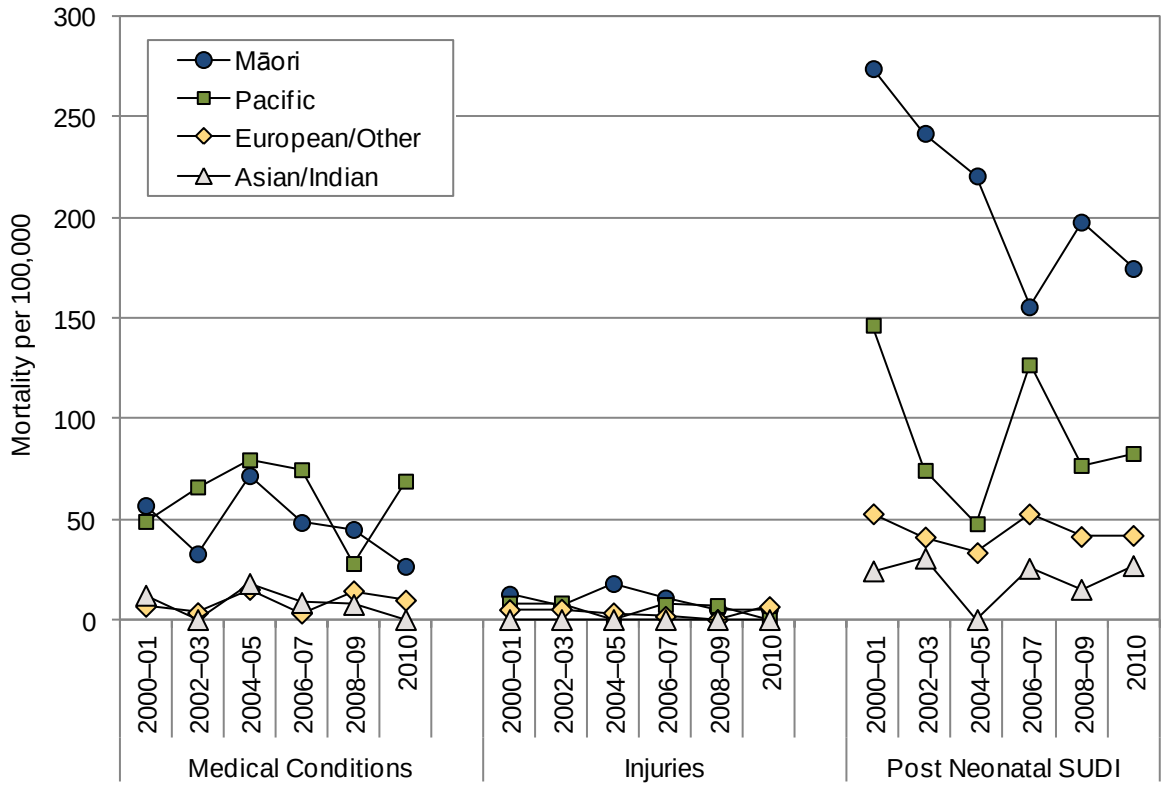
Medical Conditions: During 2000–2012, hospitalisations for medical conditions with a social gradient were consistently higher for Pacific > Māori > European/Other > Asian/Indian infants. While trends varied by ethnic group during the early to mid 2000s, rates for all four ethnic groups increased between 2007 and 2012 (**Figure 34**).

Injuries: During 2000–2012, injury admissions with a social gradient were consistently higher for Pacific, Māori and European/Other infants than for Asian/Indian infants. Large year to year variations (possibly as a result of small numbers), however, made trends in injury admission rates by ethnicity difficult to interpret (**Figure 35**).

Mortality Trends by Ethnicity

During 2000–2010, post-neonatal SUDI was consistently higher for Māori > Pacific > European/Other > Asian/Indian infants, with mortality for Māori infants declining rapidly during the early 2000s. Mortality from medical conditions with a social gradient was consistently higher for Māori and Pacific infants than for European/Other and Asian/Indian infants. Small numbers made ethnic differences in injury mortality with a social gradient difficult to interpret (**Figure 36**).

Figure 36. Mortality from Conditions with a Social Gradient in Infants Aged 29–364 Days by Ethnicity, New Zealand 2000–2010

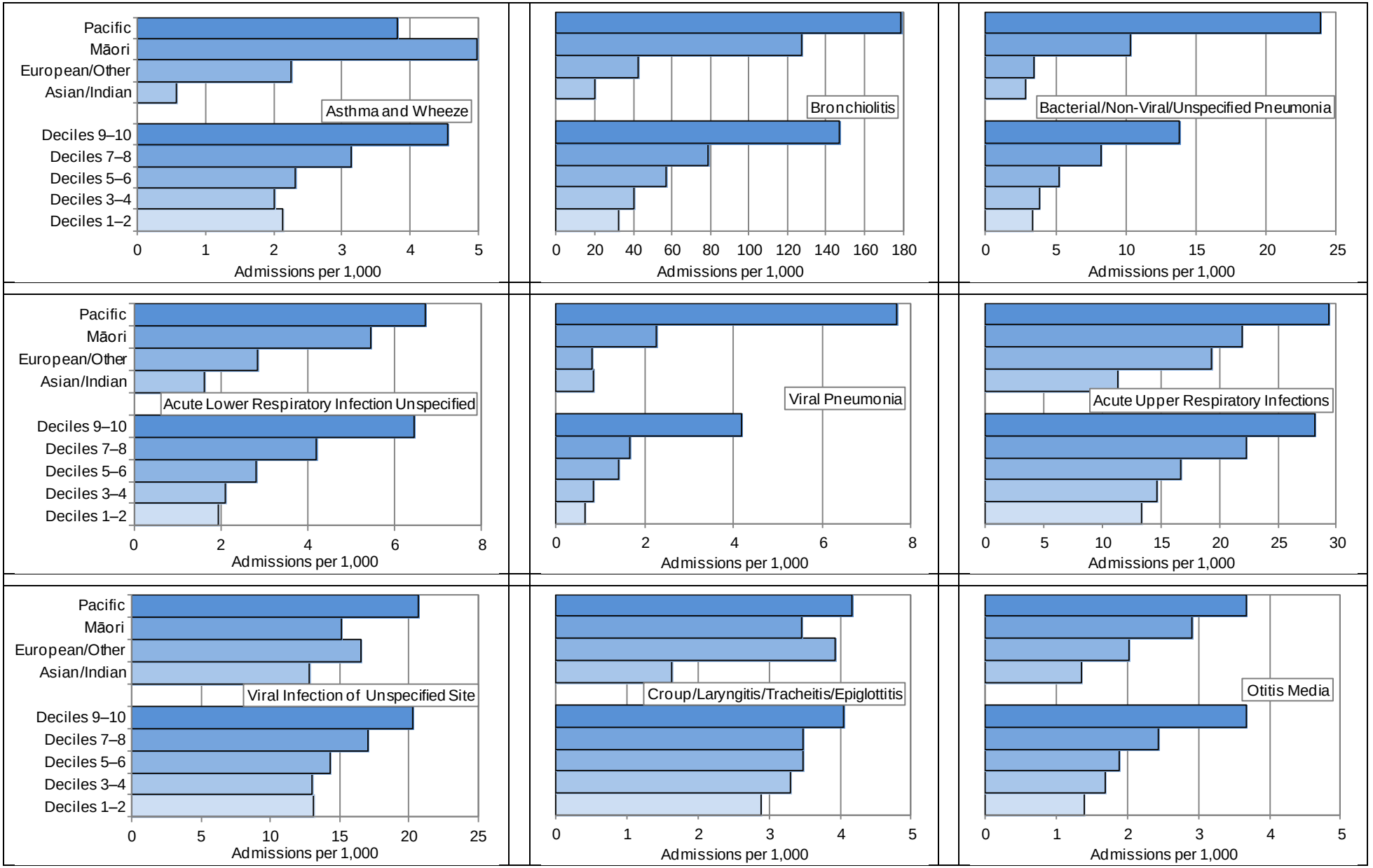


Source: Numerator: National Mortality Collection; Denominator: Birth Registration Dataset; Note: Ethnicity is Level 1 Prioritised

Distribution of Medical Conditions by Ethnicity and NZ Deprivation Index Decile

Figure 37 and **Figure 38** provide a visual overview of the social gradients in hospital admissions for individual medical conditions with a social gradient in infants aged 29–364 days, while **Table 11** and **Table 12** provide information on the numbers behind the graphs.

Figure 37: Hospital Admissions for Respiratory Conditions and Viral Infections with a Social Gradient in Infants Aged 29–364 Days by Ethnicity and NZ Deprivation Index Decile, New Zealand 2008–2012



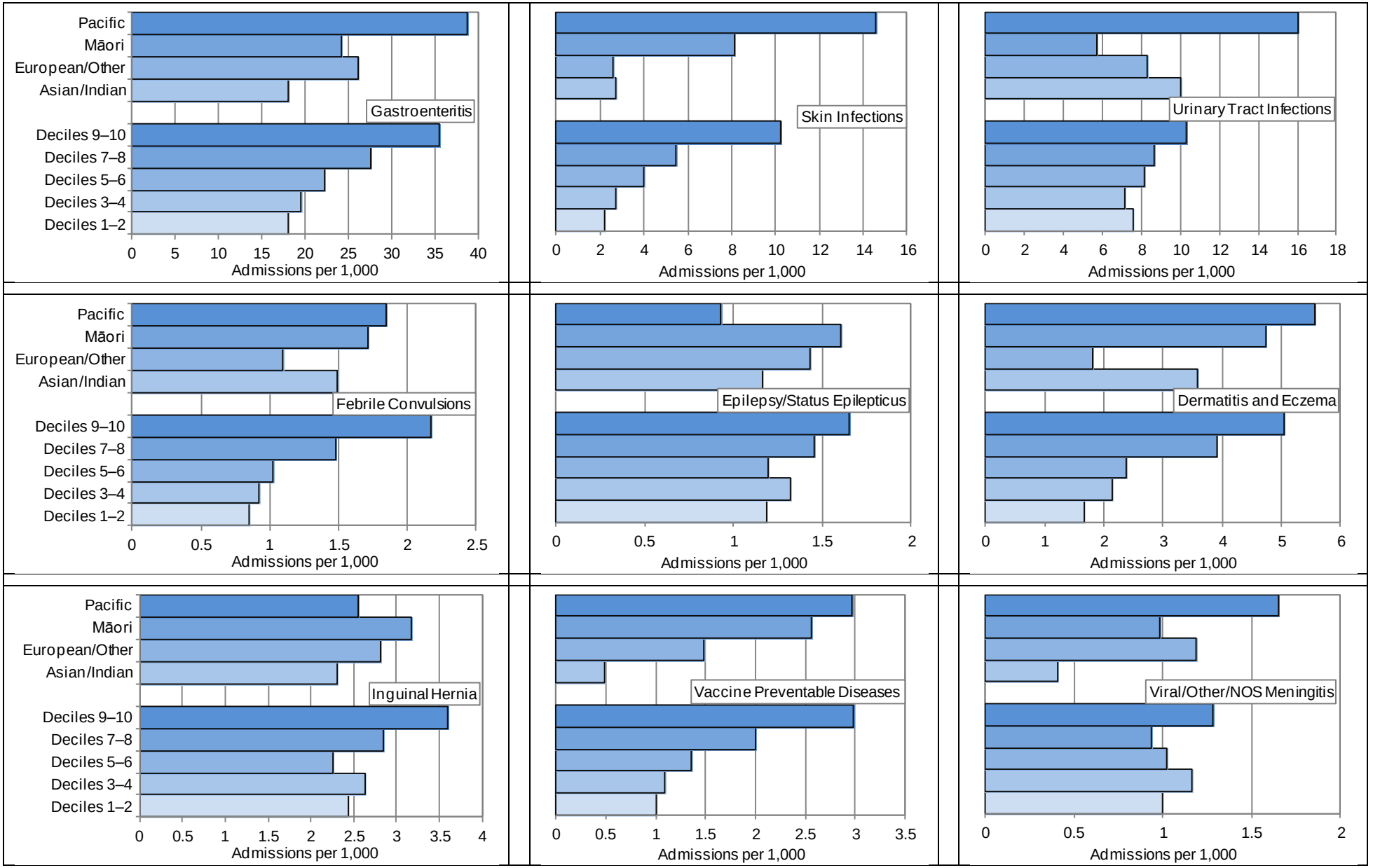
Source: Numerator: National Minimum Dataset; Denominator: Birth Registration Dataset; Note: Acute and arranged admissions only; Ethnicity is Level 1 Prioritised

Table 11. Hospital Admissions for Respiratory Conditions and Viral Infections with a Social Gradient in Infants Aged 29–364 Days by Ethnicity and NZ Deprivation Index Decile, New Zealand 2008–2012

Variable	Number: Annual Average	Rate per 1,000	Rate Ratio	95% CI	Number: Annual Average	Rate per 1,000	Rate Ratio	95% CI	Number: Annual Average	Rate per 1,000	Rate Ratio	95% CI
	Asthma and Wheeze				Bronchiolitis				Bacterial/Non-Viral Pneumonia			
Asian/Indian	4.2	0.57	0.25	0.16–0.39	145.4	19.70	0.46	0.43–0.50	21.2	2.87	0.82	0.67–1.01
European/Other	68.4	2.25	1.00		1,294.4	42.59	1.00		106.0	3.49	1.00	
Māori	92.6	4.99	2.22	1.93–2.55	2,359.4	127.13	2.98	2.90–3.07	191.6	10.32	2.96	2.66–3.29
Pacific	27.2	3.81	1.69	1.39–2.06	1,276.0	178.70	4.20	4.06–4.34	170.6	23.89	6.85	6.15–7.63
Deciles 1–2	20.0	2.12	1.00		305.4	32.44	1.00		31.0	3.29	1.00	
Deciles 3–4	20.4	2.01	0.95	0.72–1.25	411.4	40.55	1.25	1.17–1.33	38.8	3.82	1.16	0.94–1.43
Deciles 5–6	27.6	2.32	1.09	0.84–1.41	678.4	56.94	1.76	1.65–1.86	62.6	5.25	1.60	1.32–1.93
Deciles 7–8	45.8	3.14	1.48	1.17–1.87	1,145.2	78.50	2.42	2.29–2.56	120.4	8.25	2.51	2.10–2.99
Deciles 9–10	78.2	4.55	2.14	1.72–2.67	2,522.0	146.83	4.53	4.30–4.77	236.2	13.75	4.18	3.53–4.94
	Acute Lower Respiratory Infection Unspecified				Viral Pneumonia				Acute Upper Respiratory Infections			
Asian/Indian	12.0	1.63	0.57	0.44–0.75	6.2	0.84	1.04	0.70–1.54	83.0	11.25	0.58	0.53–0.65
European/Other	86.6	2.85	1.00		24.6	0.81	1.00		585.6	19.27	1.00	
Māori	101.0	5.44	1.91	1.68–2.17	41.6	2.24	2.77	2.22–3.46	408.0	21.98	1.14	1.08–1.21
Pacific	47.8	6.69	2.35	2.01–2.75	54.8	7.68	9.48	7.67–11.73	209.8	29.38	1.52	1.42–1.63
Deciles 1–2	18.4	1.95	1.00		6.2	0.66	1.00		126.0	13.38	1.00	
Deciles 3–4	21.4	2.11	1.08	0.82–1.43	8.6	0.85	1.29	0.81–2.04	149.0	14.69	1.10	0.99–1.22
Deciles 5–6	33.4	2.80	1.43	1.11–1.85	16.6	1.39	2.12	1.40–3.20	199.0	16.70	1.25	1.13–1.38
Deciles 7–8	61.2	4.20	2.15	1.70–2.71	24.0	1.65	2.50	1.68–3.71	325.4	22.30	1.67	1.52–1.83
Deciles 9–10	110.6	6.44	3.29	2.64–4.11	71.8	4.18	6.35	4.40–9.16	483.6	28.15	2.10	1.93–2.29
	Viral Infection of Unspecified Site				Croup/Laryngitis/Tracheitis/Epiglottitis				Otitis Media			
Asian/Indian	94.4	12.79	0.77	0.70–0.85	12.0	1.63	0.41	0.32–0.54	10.0	1.36	0.67	0.50–0.90
European/Other	504.2	16.59	1.00		119.2	3.92	1.00		61.6	2.03	1.00	
Māori	281.4	15.16	0.91	0.86–0.98	64.0	3.45	0.88	0.77–1.01	53.8	2.90	1.43	1.21–1.68
Pacific	147.8	20.70	1.25	1.15–1.35	29.8	4.17	1.06	0.89–1.27	26.2	3.67	1.81	1.48–2.22
Deciles 1–2	123.2	13.09	1.00		27.2	2.89	1.00		13.0	1.38	1.00	
Deciles 3–4	131.6	12.97	0.99	0.89–1.11	33.4	3.29	1.14	0.91–1.43	17.0	1.68	1.21	0.88–1.68
Deciles 5–6	171.2	14.37	1.10	0.99–1.22	41.4	3.48	1.20	0.97–1.49	22.4	1.88	1.36	1.00–1.85
Deciles 7–8	249.4	17.10	1.31	1.19–1.44	50.8	3.48	1.21	0.98–1.48	35.6	2.44	1.77	1.33–2.35
Deciles 9–10	348.2	20.27	1.55	1.41–1.70	69.6	4.05	1.40	1.15–1.71	63.0	3.67	2.66	2.03–3.47

Source: Numerator: National Minimum Dataset; Denominator: Birth Registration Dataset; Note: Acute and arranged admissions only; Rates are per 1,000; Rate Ratios are unadjusted

Figure 38: Hospital Admissions for Selected Medical Conditions with a Social Gradient in Infants Aged 29–364 Days by Ethnicity and NZ Deprivation Index Decile, New Zealand 2008–2012



Source: Numerator: National Minimum Dataset; Denominator: Birth Registration Dataset; Note: Acute and arranged admissions only; Ethnicity is Level 1 Prioritised

Table 12. Hospital Admissions for Selected Medical Conditions with a Social Gradient in Infants Aged 29–364 Days by Ethnicity and NZ Deprivation Index Decile, New Zealand 2008–2012

Variable	Number: Annual Average	Rate per 1,000	Rate Ratio	95% CI	Number: Annual Average	Rate per 1,000	Rate Ratio	95% CI	Number: Annual Average	Rate per 1,000	Rate Ratio	95% CI
	Gastroenteritis				Skin Infections				Urinary Tract Infection			
Asian/Indian	133.0	18.02	0.69	0.63–0.75	20.0	2.71	1.06	0.85–1.32	73.8	10.00	1.21	1.07–1.35
European/Other	796.8	26.22	1.00		78.0	2.57	1.00		252.2	8.30	1.00	
Māori	448.8	24.18	0.92	0.88–0.97	150.4	8.10	3.16	2.79–3.57	106.0	5.71	0.69	0.62–0.76
Pacific	277.2	38.82	1.48	1.39–1.57	104.2	14.59	5.69	4.99–6.48	114.6	16.05	1.93	1.75–2.13
Deciles 1–2	169.8	18.04	1.00		20.8	2.21	1.00		71.0	7.54	1.00	
Deciles 3–4	198.6	19.57	1.09	0.99–1.19	27.6	2.72	1.23	0.95–1.59	72.6	7.16	0.95	0.82–1.10
Deciles 5–6	266.2	22.34	1.24	1.14–1.35	47.6	4.00	1.81	1.44–2.28	96.8	8.12	1.08	0.94–1.23
Deciles 7–8	403.6	27.66	1.53	1.42–1.66	79.8	5.47	2.48	2.00–3.07	126.4	8.66	1.15	1.01–1.31
Deciles 9–10	610.2	35.53	1.97	1.83–2.12	176.2	10.26	4.64	3.79–5.69	176.6	10.28	1.36	1.21–1.54
	Febrile Convulsions				Epilepsy/Status Epilepticus				Dermatitis and Eczema			
Asian/Indian	11.0	1.49	1.36	1.00–1.84	8.6	1.17	0.82	0.59–1.13	26.4	3.58	1.98	1.61–2.43
European/Other	33.4	1.10	1.00		43.4	1.43	1.00		55.0	1.81	1.00	
Māori	31.8	1.71	1.56	1.25–1.94	29.8	1.61	1.12	0.91–1.38	88.0	4.74	2.62	2.25–3.05
Pacific	13.2	1.85	1.68	1.27–2.24	6.6	0.92	0.65	0.45–0.93	39.8	5.57	3.08	2.57–3.70
Deciles 1–2	8.0	0.85	1.00		11.2	1.19	1.00		15.8	1.68	1.00	
Deciles 3–4	9.4	0.93	1.09	0.72–1.66	13.4	1.32	1.11	0.78–1.58	21.8	2.15	1.28	0.96–1.71
Deciles 5–6	12.2	1.02	1.21	0.81–1.80	14.2	1.19	1.00	0.71–1.42	28.2	2.37	1.41	1.07–1.86
Deciles 7–8	21.6	1.48	1.74	1.21–2.50	21.2	1.45	1.22	0.88–1.69	57.0	3.91	2.33	1.82–2.99
Deciles 9–10	37.4	2.18	2.56	1.82–3.60	28.4	1.65	1.39	1.02–1.89	86.8	5.05	3.01	2.37–3.83
	Inguinal Hernia				Vaccine Preventable Diseases				Viral/Other/NOS Meningitis			
Asian/Indian	17.0	2.30	0.82	0.65–1.03	3.6	0.49	0.33	0.20–0.53	3.0	0.41	0.34	0.20–0.58
European/Other	85.4	2.81	1.00		45.0	1.48	1.00		36.0	1.18	1.00	
Māori	59.0	3.18	1.13	0.98–1.31	47.6	2.57	1.73	1.44–2.08	18.2	0.98	0.83	0.64–1.07
Pacific	18.2	2.55	0.91	0.72–1.14	21.2	2.97	2.01	1.59–2.53	11.8	1.65	1.40	1.04–1.87
Deciles 1–2	23.0	2.44	1.00		9.4	1.00	1.00		9.4	1.00	1.00	
Deciles 3–4	26.8	2.64	1.08	0.84–1.39	11.0	1.08	1.09	0.74–1.60	11.8	1.16	1.16	0.79–1.71
Deciles 5–6	27.0	2.27	0.93	0.72–1.19	16.2	1.36	1.36	0.95–1.95	12.2	1.02	1.03	0.70–1.50
Deciles 7–8	41.6	2.85	1.17	0.93–1.47	29.2	2.00	2.00	1.44–2.78	13.6	0.93	0.93	0.64–1.35
Deciles 9–10	61.8	3.60	1.47	1.19–1.82	51.2	2.98	2.99	2.19–4.07	22.0	1.28	1.28	0.91–1.80

Source: Numerator: National Minimum Dataset; Denominator: Birth Registration Dataset; Note: Acute and arranged admissions only; Rates are per 1,000; Rate Ratios are unadjusted

INFANT MORTALITY AND SUDDEN UNEXPECTED DEATH IN INFANCY

Introduction

Infant mortality is often used as a barometer of the social wellbeing of a country [35], with rates usually being much higher for babies from more socioeconomically deprived areas [31]. New Zealand's infant mortality rates are middling by international standards, being lower than those of the USA and some Eastern European countries, but higher than those of Central and Northern Europe [36]. However, mortality during the first year of life remains much higher than at any other point during childhood or adolescence, with 308 New Zealand infants dying prior to their first birthday during 2009 [37].

Despite the relatively high number of deaths, New Zealand's infant mortality rates have declined during the past 40 years with rates falling from 16.9 per 1,000 live births in 1969 to 4.9 per 1,000 in March 2009 [37]. However, while total infant mortality rates are generally higher for Pacific and Māori babies, for males, and those in the most deprived areas [38], total infant mortality is of limited utility in guiding population health interventions as the causes of mortality differ markedly with the age of the infant. During the neonatal period (birth–28 days) extreme prematurity, congenital anomalies and intrauterine/birth asphyxia are the leading causes of mortality, while in the post neonatal period (29–364 days) sudden unexpected death in infancy (SUDI) and congenital anomalies make the greatest contribution [31]. Thus any interventions aimed at reducing New Zealand's infant mortality rates must, in the first instance, be based on an understanding of their component causes.

The following section uses information from the National Mortality Collection to review neonatal and post neonatal mortality rates, as well as SUDI during the past two decades.

Data Source and Methods

Definition

1. *Total Infant Mortality: Death of a live born infant prior to 365 days of life*
2. *Neonatal Mortality: Death of a live born infant in the first 28 days of life*
3. *Post Neonatal Mortality: Death of a live born infant after 28 days but prior to 365 days of life*
4. *Sudden Unexpected Death in Infancy (SUDI): Death of a live born infant <365 days of life, where the cause of death is Sudden Infant Death Syndrome (SIDS), Accidental Suffocation/Strangulation in Bed, Inhalation of Food or Gastric Contents, or Ill-Defined/Unspecified Causes*

Data Sources

Numerator: National Mortality Collection: All deaths in the first year of life using the definitions for total infant, neonatal and post neonatal mortality outlined above. Cause of death is derived from the ICD-10-AM main underlying cause of death as follows: Congenital Anomalies: CVS (Q20–Q28); Congenital Anomalies: CNS (Q00–Q07); Congenital Anomalies: Other (Q00–Q99); Intrauterine/Birth Asphyxia (P20–P21); Extreme Prematurity (P07.2); Other Perinatal Conditions (P00–P96); SUDI: SIDS (R95); SUDI: Unspecified (R96, R98, R99); SUDI: Suffocation/Strangulation in Bed (W75); SUDI: Inhalation of Food or Gastric Contents *(W78, W79);* Injury/ Poisoning (V01–Y36).

Denominator: Birth Registration Dataset (Live Births Only)

Notes on Interpretation

SIDS and SUDI: SIDS is defined as "the sudden unexpected death of an infant <1 year with onset of the fatal episode apparently occurring during sleep, that remains unexplained after a thorough investigation, including performance of a complete autopsy and review of the circumstances of death and the clinical history [39]".

In New Zealand, while SIDS rates have declined, large ethnic differences remain with SIDS being 6 fold higher for Māori than for European infants [31]. In addition, new issues with the definition of SIDS have emerged, possibly as the result of pathologists and coroners becoming increasingly reluctant to label a death as SIDS in the context of equivocal death scene findings (e.g. infant co-sleeping with parental alcohol consumption [40]). This has resulted in a fall in the number of SIDS deaths, and a rise in the number of deaths attributed to "suffocation/strangulation in bed" or "unspecified causes". In turn, this has led to the adoption of the term Sudden Unexpected Death in Infancy (SUDI), to try to provide some consistency for measuring trends in the face of probable diagnostic transfer [40].

Total Infant, Neonatal and Post Neonatal Mortality

Distribution by Cause

During 2006–2010, extreme prematurity and congenital anomalies were the leading causes of neonatal mortality, although intrauterine/birth asphyxia and other perinatal conditions also made a significant contribution. In contrast, SUDI was the leading cause of post neonatal mortality, followed by congenital anomalies (**Table 13**).

Table 13. Neonatal and Post Neonatal Mortality Cause of Death, New Zealand 2006–2010

Cause of Death	Number: Total 2006–2010	Number: Annual Average	Rate	Percent of Deaths (%)
New Zealand				
Neonatal Mortality				
Extreme Prematurity	239	47.8	74.99	25.0
Congenital Anomalies: CVS	63	12.6	19.77	6.6
Congenital Anomalies: CNS	43	8.6	13.49	4.5
Congenital Anomalies: Other	139	27.8	43.61	14.6
Intrauterine/Birth Asphyxia	43	8.6	13.49	4.5
Other Perinatal Conditions	341	68.2	106.99	35.7
SUDI: Suffocation/Strangulation in Bed	27	5.4	8.47	2.8
SUDI: All Other Types	15	3.0	4.71	1.6
Injury/Poisoning	7	1.4	2.20	0.7
Other Causes	38	7.6	11.92	4.0
Total Neonatal Mortality	955	191.0	299.64	100.0
Post Neonatal Mortality				
SUDI: SIDS	164	32.8	51.46	24.1
SUDI: Suffocation/Strangulation in Bed	102	20.4	32.00	15.0
SUDI: All Other Types	13	2.6	4.08	1.9
Congenital Anomalies: CVS	53	10.6	16.63	7.8
Congenital Anomalies: CNS	8	1.6	2.51	1.2
Congenital Anomalies: Other	62	12.4	19.45	9.1
Other Perinatal Conditions	81	16.2	25.42	11.9
Injury/Poisoning	24	4.8	7.53	3.5
Other Causes	173	34.6	54.28	25.4
Total Post Neonatal Mortality	680	136.0	213.36	100.0
New Zealand Total	1,635	327.0	513.00	100.0

Source: Numerator: National Mortality Collection; Denominator: Birth Registration Dataset; Note: CVS = Cardiovascular system; CNS = Central Nervous System; Rates are per 100,000 Live Births

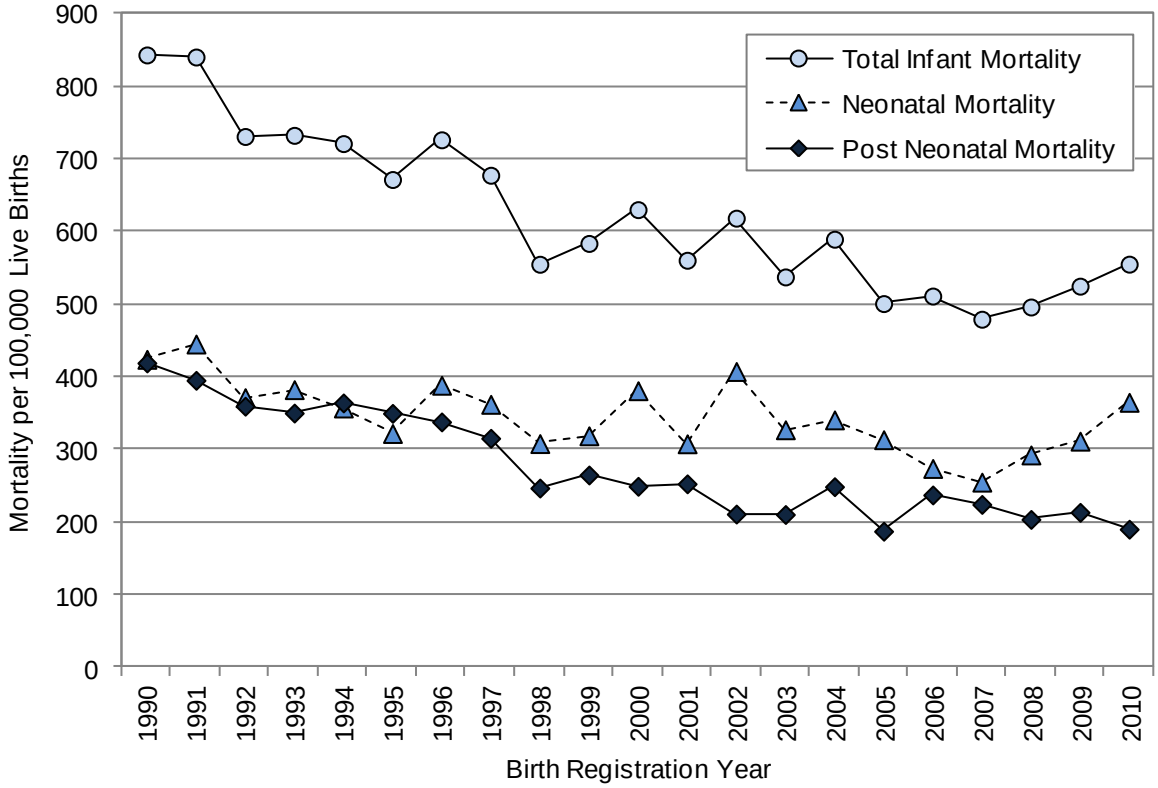
New Zealand Trends

In New Zealand during the 1990s, neonatal and post neonatal mortality both declined, although rates were more static during the mid to late 2000s. An upswing in neonatal mortality was evident however, during 2007–2010 (**Figure 39**).

Trends by Ethnicity

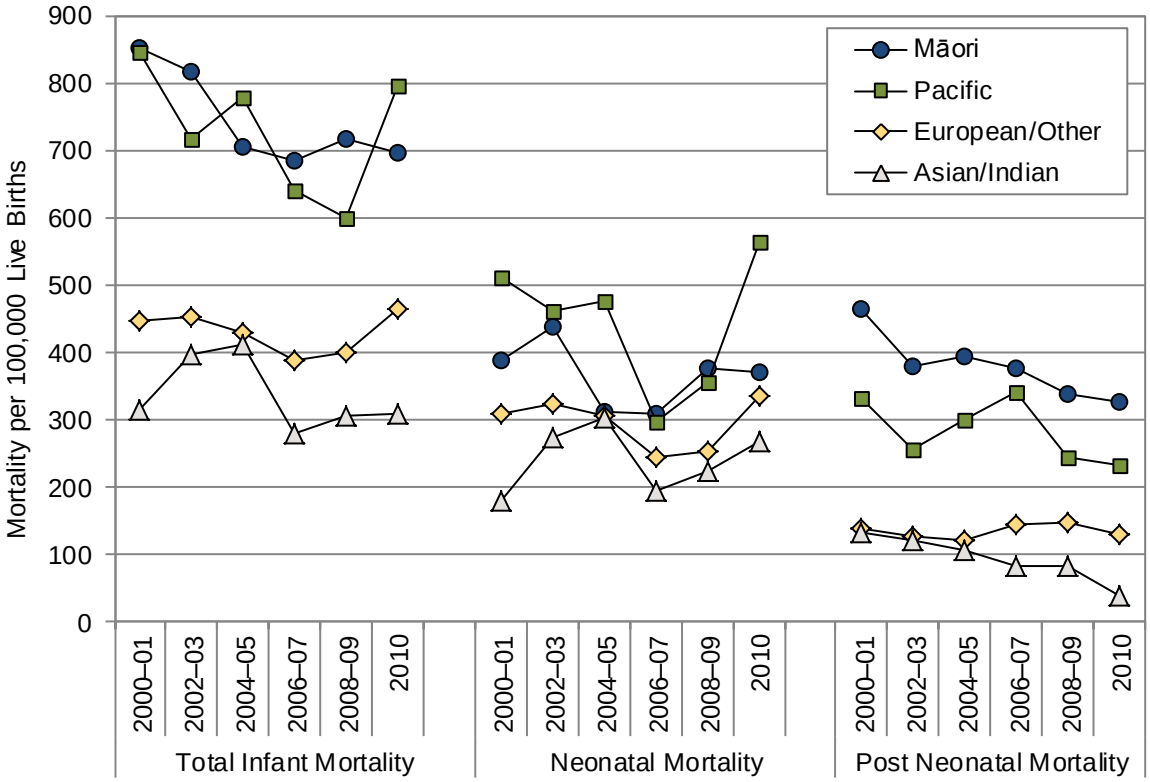
During 2000–2010, while there was some year to year variation, neonatal mortality was generally higher for Pacific and Māori infants than for European and Asian/Indian infants. Post neonatal mortality however was consistently higher for Māori > Pacific > European and Asian/Indian infants throughout this period (**Figure 40**).

Figure 39. Total Infant, Neonatal and Post Neonatal Mortality, New Zealand 1990–2010



Source: Numerator: National Mortality Collection; Denominator: Birth Registration Dataset

Figure 40. Total Infant, Neonatal and Post Neonatal Mortality by Ethnicity, New Zealand 2000–2010



Source: Numerator: National Mortality Collection; Denominator: Birth Registration Dataset; Note: Ethnicity is Level 1 prioritised

Distribution by Ethnicity, NZ Deprivation Index Decile and Gender

During 2006–2010, neonatal mortality was *significantly* higher for Pacific and Māori infants than for European/Other and Asian/Indian infants, for males and those from average to more deprived (NZDep deciles 3–10) areas. During the same period, post neonatal mortality was *significantly* higher for Māori and Pacific > European/Other > Asian/Indian infants, for males and those from more deprived (NZDep deciles 7–10) areas (**Table 14**).

Table 14. Distribution of Neonatal and Post Neonatal Mortality by NZ Deprivation Index Decile, Ethnicity and Gender, New Zealand 2006–2010

Neonatal Mortality							
Variable	Rate	RR	95% CI	Variable	Rate	RR	95% CI
NZ Deprivation Index Decile				Ethnicity			
Deciles 1–2	176.1	1.00		Asian/Indian	224.3	0.84	0.66–1.08
Deciles 3–4	241.6	1.37	1.04–1.81	European/Other	266.0	1.00	
Deciles 5–6	260.4	1.48	1.13–1.93	Māori	348.6	1.31	1.13–1.51
Deciles 7–8	309.2	1.76	1.37–2.25	Pacific	376.9	1.42	1.17–1.72
Deciles 9–10	421.3	2.39	1.89–3.03	Gender			
				Female	269.8	1.00	
				Male	327.8	1.21	1.07–1.38
Post Neonatal Mortality							
NZ Deprivation Index Decile				Ethnicity			
Deciles 1–2	119.5	1.00		Asian/Indian	73.7	0.51	0.34–0.78
Deciles 3–4	119.8	1.00	0.70–1.44	European/Other	144.2	1.00	
Deciles 5–6	159.6	1.34	0.96–1.85	Māori	352.9	2.45	2.07–2.90
Deciles 7–8	184.1	1.54	1.13–2.10	Pacific	279.8	1.94	1.53–2.46
Deciles 9–10	377.2	3.16	2.38–4.18	Gender			
				Female	181.4	1.00	
				Male	243.6	1.34	1.15–1.56

Source: Numerator: National Mortality Collection; Denominator: Birth Registration Dataset; Note: Rates are per 100,000 live births; (RR) Rate Ratios are unadjusted; Ethnicity is Level 1 prioritised

Sudden Unexpected Death in Infancy (SUDI)

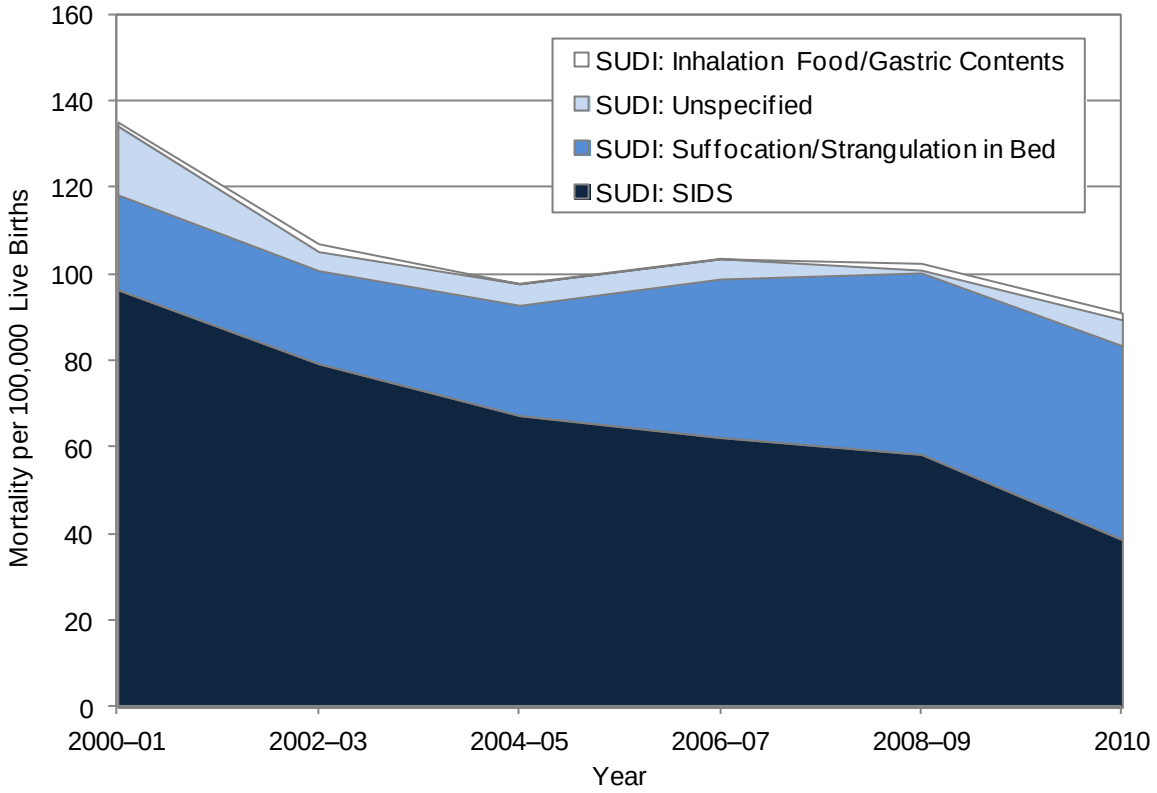
New Zealand Trends

In New Zealand, SUDI rates declined during the early 2000s, were relatively static during the mid-2000s, and then declined again during 2010. When broken down by SUDI sub-type, deaths attributed to SIDS continued to decline throughout 2000–2010, while deaths due to suffocation or strangulation in bed became more prominent as the period progressed. It is unclear however, whether this represented a diagnostic shift in the coding of SUDI, or whether the sleeping environment made an increasingly greater contribution to SUDI as the period progressed (**Figure 41**).

Distribution by Age

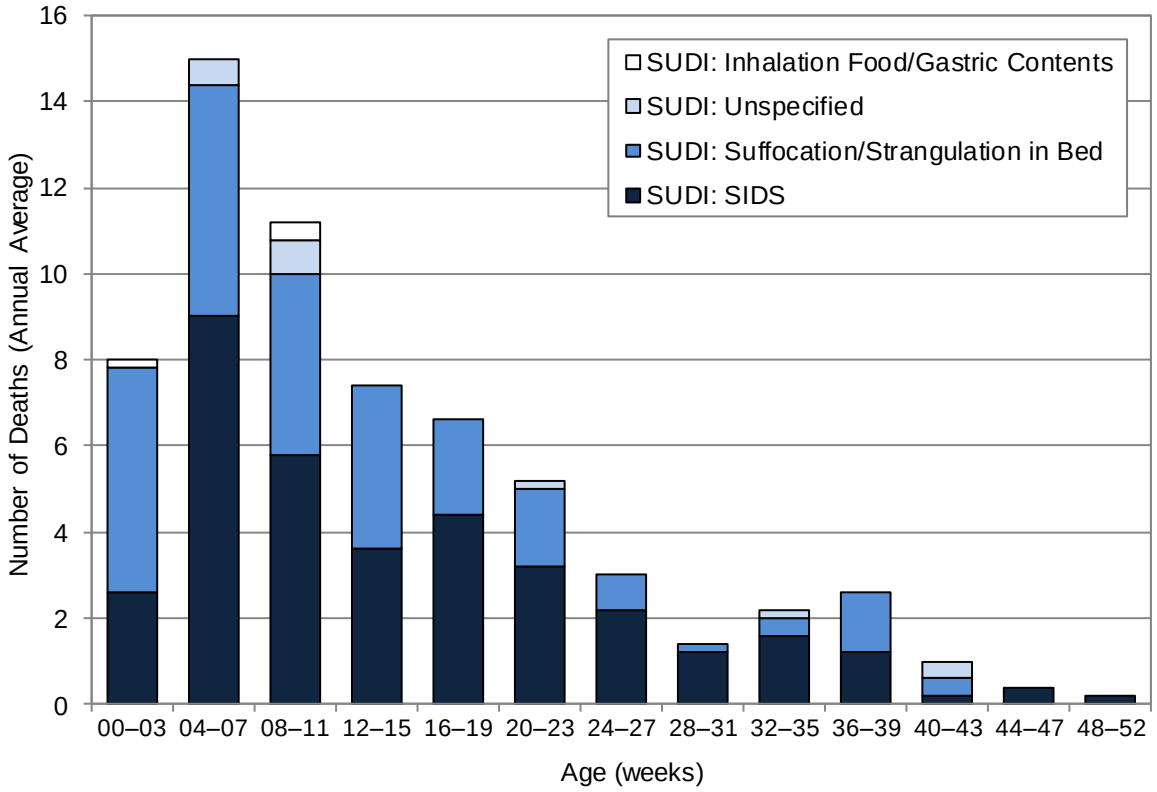
During 2006–2010, SUDI mortality was highest in infants aged 4–7 weeks, followed by those 8–11 weeks and then those 0–3 weeks of age. Suffocation/strangulation in bed accounted for 44.7% of all SUDI deaths in those less than 16 weeks of age (**Figure 42**).

Figure 41. Sudden Unexpected Death in Infancy by Type, New Zealand 2000–2010



Source: Numerator: National Mortality Collection; Denominator: Birth Registration Dataset

Figure 42. Sudden Unexpected Death in Infancy by Type and Age in Weeks, New Zealand 2006–2010



Source: National Mortality Collection

Distribution by Ethnicity, NZ Deprivation Index Decile and Gender

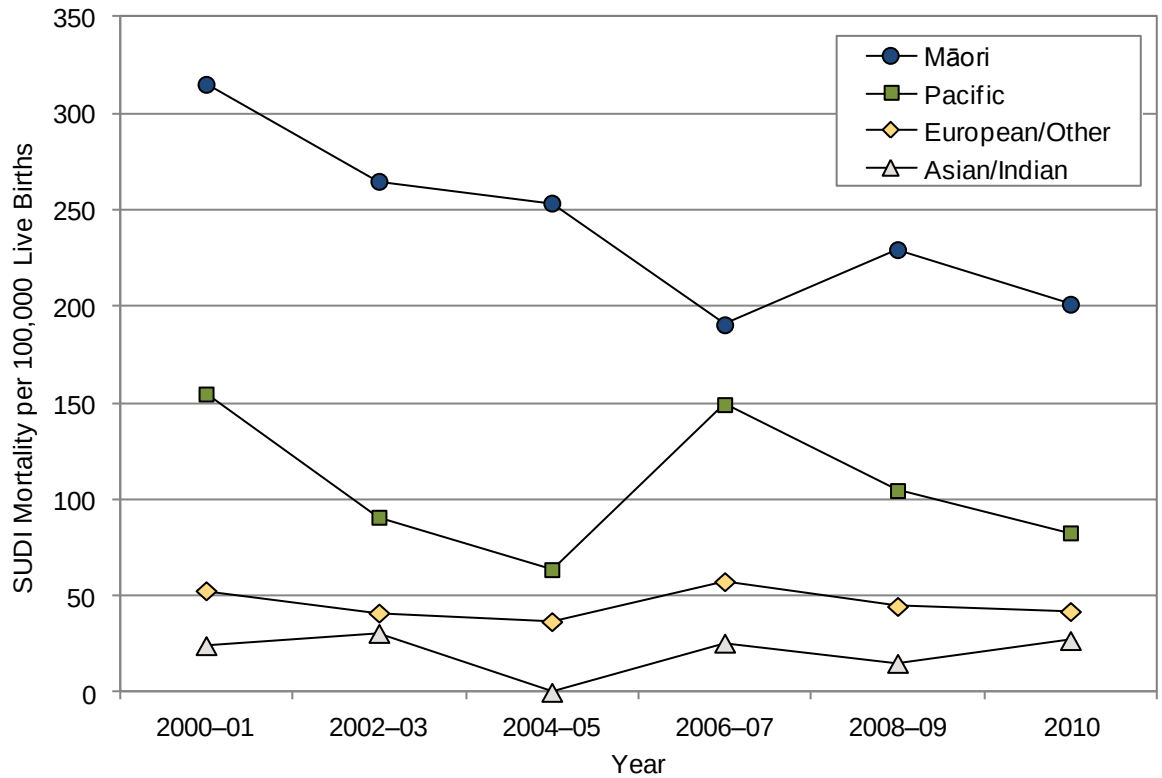
During 2006–2010, SUDI rates were *significantly* higher for Māori and Pacific > European/Other > Asian/Indian infants and those from more deprived (NZDep deciles 7–10) areas (**Table 15**). Similarly, SUDI rates were consistently higher for Māori > Pacific > European/Other > Asian/Indian infants during 2000–2010 (**Figure 43**).

Table 15. Distribution of Sudden Unexpected Death in Infancy by NZ Deprivation Index Decile, Ethnicity and Gender, New Zealand 2006–2010

Sudden Unexpected Death in Infancy (SUDI)							
Variable	Rate	RR	95% CI	Variable	Rate	RR	95% CI
NZ Deprivation Index Decile				Ethnicity			
Deciles 1–2	39.84	1.00		Asian/Indian	21.51	0.44	0.20–0.95
Deciles 3–4	45.17	1.13	0.62–2.08	European/Other	49.12	1.00	
Deciles 5–6	57.13	1.43	0.82–2.51	Māori	208.32	4.24	3.26–5.52
Deciles 7–8	97.56	2.45	1.48–4.06	Pacific	117.08	2.38	1.63–3.48
Deciles 9–10	200.77	5.04	3.14–8.09	Gender			
				Female	83.92	1.00	
				Male	116.61	1.39	1.11–1.74

Source: Numerator: National Mortality Collection; Denominator: Birth Registration Dataset; Note: Rates are per 100,000 live births; Rate Ratios are unadjusted; Ethnicity is Level 1 prioritised

Figure 43. Sudden Unexpected Death in Infancy by Ethnicity, New Zealand 2000–2010



Source: Numerator: National Mortality Collection; Denominator: Birth Registration Dataset; Note: Ethnicity is Level 1 Prioritised

THE ASSAULT, NEGLECT AND MALTREATMENT OF CHILDREN

Introduction

Child maltreatment has been defined as any act of commission or omission by a parent or caregiver that results in harm, or the potential for harm, to a child [41]. It includes neglect, physical, sexual and emotional abuse, and fabricated illness [42], with physical abuse potentially leading on to disability or death. In New Zealand, hospital admissions for child maltreatment are much higher for children from more socioeconomically deprived areas [31].

The psychological effects of maltreatment, which can persist into adulthood, include anxiety, depression, substance misuse, and self-destructive, oppositional or antisocial behaviours. Childhood exposure to maltreatment has also been linked to difficulties in forming or sustaining close relationships in adulthood, as well as issues with employment and parenting capacity [43].

As a consequence, there has been an increasing awareness of the need to identify vulnerable children early, so that services and interventions can be put in place to protect them from on-going or future harm. The White Paper for Vulnerable Children [44] and the New Zealand Children's Action Plan [45] outline potential ways forward in this area.

Broadening the Child Assault Measure

The previous NZ Children's Social Health Monitor monitored hospital admissions for injuries arising from the assault, neglect or maltreatment of children aged 0–14 years from its inception, due to concerns about the potential impacts of the recent economic downturn on family cohesion. However, this indicator excluded children discharged directly from the Emergency Department (ED), or those with a primary diagnosis outside of the injury range (ICD-10-AM S00–T79). The inpatient injury focus was selected because of regional inconsistencies in the uploading of ED cases to the National Minimum Dataset (NMDS), and because inpatient injury admissions were seen as a relatively stable measure of serious harm, which could be monitored consistently over time.

With the consistency of uploading ED cases to the NMDS improving, and with Government policy increasingly focusing on the early identification of children vulnerable to abuse, the launch of the new Technical Report was seen as a good opportunity to review the scope of this indicator, with a view to determining whether a broader focus would yield additional information on the extent to which New Zealand children are exposed to assault, neglect or maltreatment.

With these issues in mind, the following section is split into two parts:

1. *Hospital admissions and mortality for injuries arising from assault, neglect or maltreatment in children 0–14 years*: This section, which uses an identical methodology to the Children's Social Health Monitor, reviews hospital admissions with a primary diagnosis of injury (ICD-10-AM S00–T79) and an external cause code of intentional injury (ICD-10-AM X85–Y09). In this analysis, all admissions with an ED health specialty code on discharge have been excluded, as have those admissions where the primary diagnosis lies outside of the injury range (ICD-10-AM S00–T79).
2. *Hospital admissions for assault, neglect or maltreatment in children aged 0–4 years*: This section reviews all hospital admissions with an external cause code of intentional injury (ICD-10-AM X85–Y09). It includes both inpatient and emergency department injury admissions, as well as those with a primary diagnosis outside of the S00–T79 injury range (the majority of whom were admitted for observation or for other reasons). Further detail on the rationale for broadening the focus of this indicator, and the selection of the 0–4 year age group, is included at the beginning of this sub-section.

Hospital Admissions and Mortality from Injuries Arising From the Assault, Neglect or Maltreatment of Children 0–14 Years

Data Source and Methods

Definition

1. Hospitalisations for injuries arising from the assault, neglect or maltreatment of children aged 0–14 years

2. Deaths from injuries arising from the assault, neglect or maltreatment of children aged 0–14 years

Data Source

1. Hospital Admissions

Numerator: National Minimum Dataset: Hospital admissions for children (0–14 years) with a primary diagnosis of injury (ICD-10-AM S00–T79) and an external cause code of intentional injury (ICD-10-AM X85–Y09) in any of the first 10 External Cause codes. As outlined in **Appendix 4**, in order to ensure comparability over time, all cases with an Emergency Department Specialty Code (M05–M08) on discharge were excluded.

Denominator: NZ Statistics NZ Estimated Resident Population (projected from 2007)

2. Mortality

Numerator: National Mortality Collection: Deaths in children (0–14 years) with a clinical code (cause of death) of Intentional Injury (ICD-10-AM X85–Y09).

Denominator: NZ Statistics NZ Estimated Resident Population (projected from 2007)

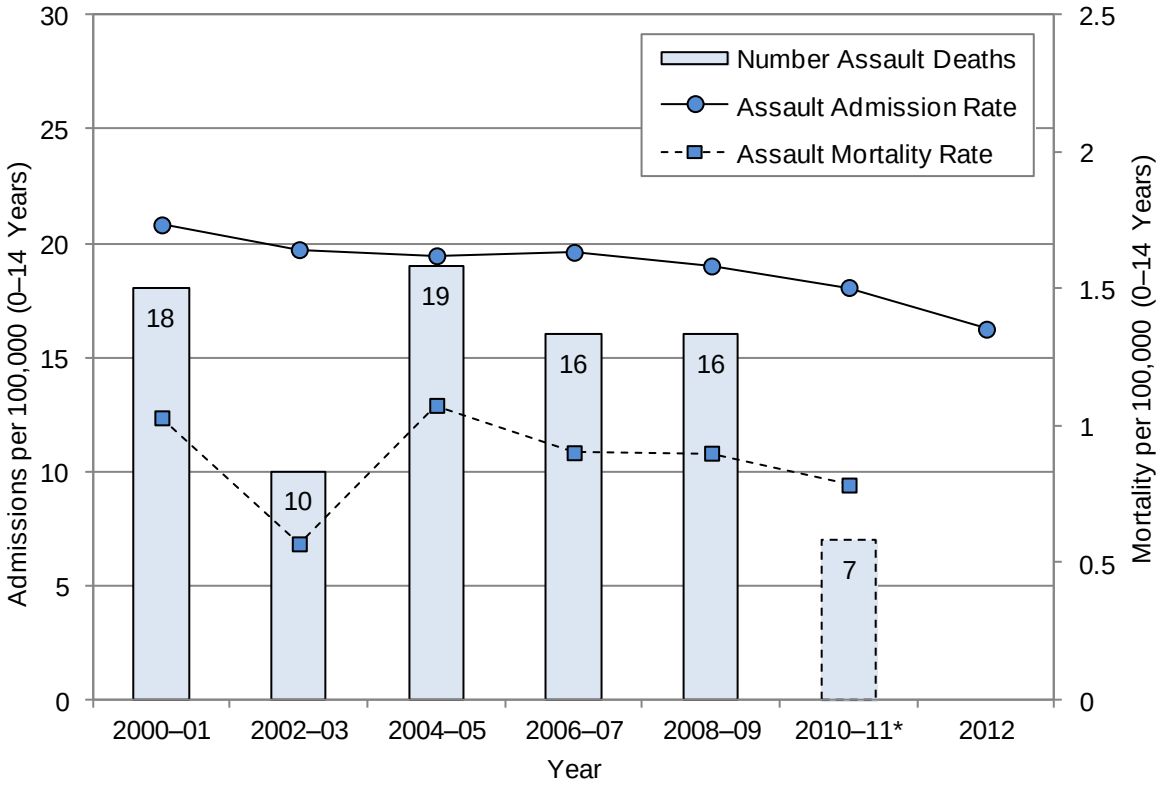
Interpretation

The limitations of the National Minimum Dataset are discussed at length in **Appendix 4**. The reader is urged to review this Appendix before interpreting any trends based on hospital admission data.

New Zealand Trends

In New Zealand during 2000–2012, hospital admissions for injuries arising from the assault, neglect or maltreatment of children declined, while mortality during 2000–2010 remained relatively static. On average during 2000–2010, eight children per year died as a result of injuries arising from assault, neglect or maltreatment (**Figure 44**).

Figure 44. Hospital Admissions (2000–2012) and Deaths (2000–2010) due to Injuries Arising from the Assault, Neglect or Maltreatment of New Zealand Children 0–14 Years

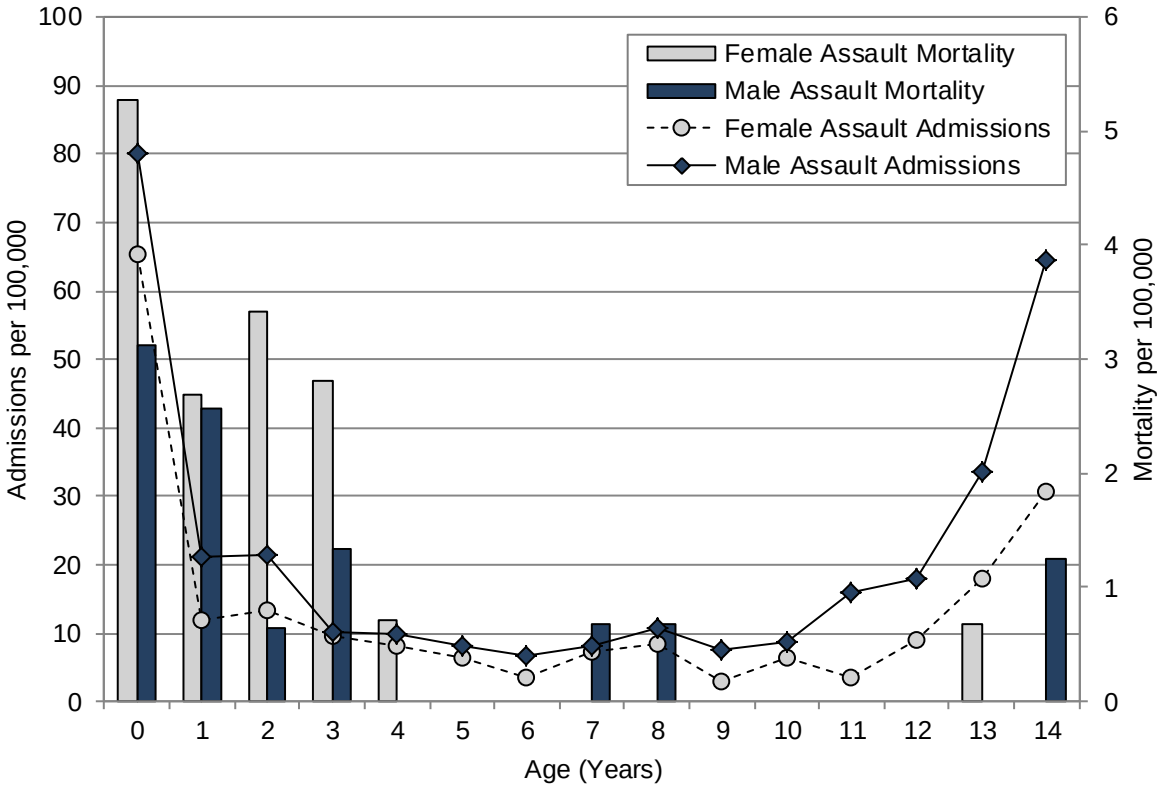


Source: Numerator Admissions: National Minimum Dataset; Numerator Mortality: National Mortality Collection; Denominator: Statistics NZ Estimated Resident Population (projected from 2007); Note: Emergency Department cases excluded; *2010–11 Number of Deaths is for one year only (2010)

New Zealand Distribution by Age and Gender

During 2008–2012, hospital admissions for injuries arising from the assault, neglect or maltreatment of children exhibited a U-shaped distribution with age, with rates being higher for infants less than one year and those over eleven years of age. In contrast, mortality was highest for infants less than one year, followed by pre-school aged children. While the gender balance for admissions was relatively even during early childhood, admissions for males became more prominent as adolescence approached (**Figure 45**).

Figure 45. Hospital Admissions (2008–2012) and Deaths (2006–2010) due to Injuries Arising from the Assault, Neglect or Maltreatment of New Zealand Children by Age and Gender

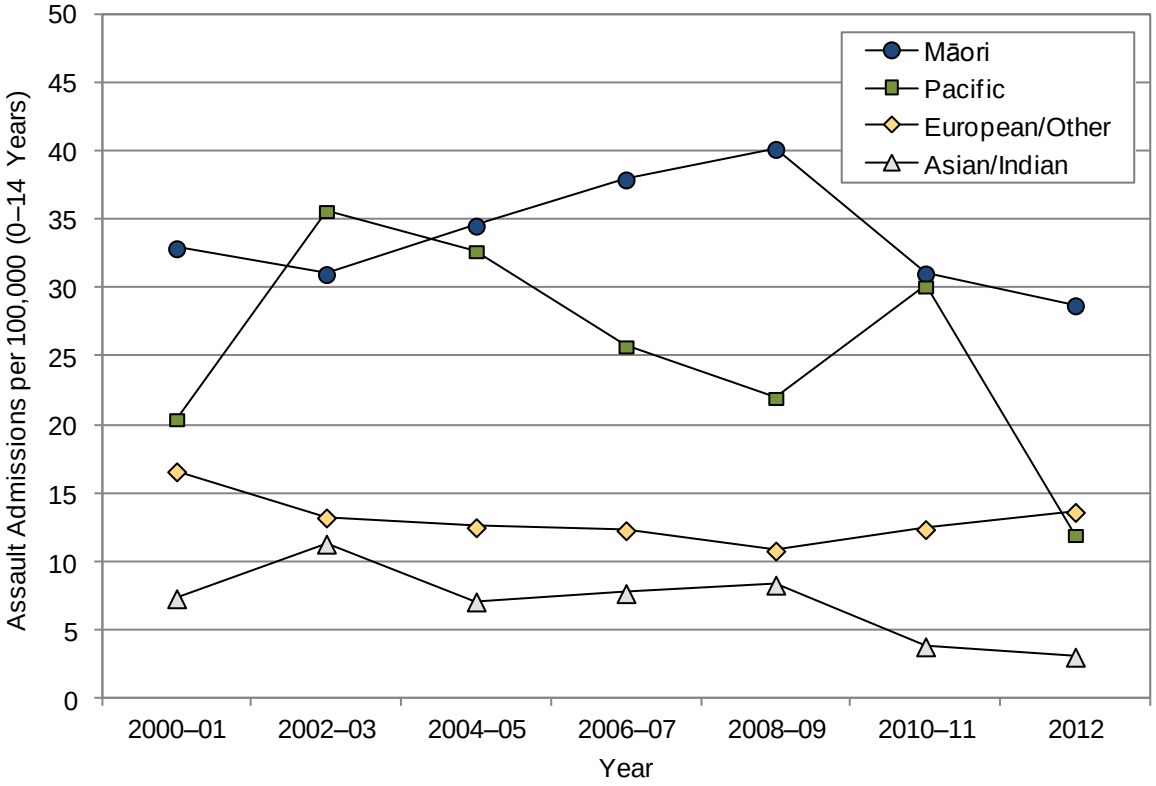


Source: Numerator Admissions: National Minimum Dataset; Numerator Mortality: National Mortality Collection; Denominator: Statistics NZ Estimated Resident Population (projected from 2007); Note: Emergency Department cases excluded

New Zealand Trends by Ethnicity

During 2000–2012, hospital admissions for injuries arising from assault, neglect or maltreatment were consistently higher for Māori and Pacific children than for European/Other and Asian/Indian children. While rates for Māori children increased during the early to mid-2000s, they declined during 2010–2012, whereas trends for Pacific children were more variable. Admissions for European/Other children declined during the early to mid 2000s, but then increased slightly during 2010–2012, while admissions for Asian/Indian children exhibited a general downward trend (**Figure 46**).

Figure 46. Hospital Admissions for Injuries Arising from the Assault, Neglect or Maltreatment of Children 0–14 Years by Ethnicity, New Zealand 2000–2012



Source: Numerator: National Minimum Dataset; Denominator: Statistics NZ Estimated Resident Population (projected from 2007); Note: Ethnicity is Level 1 Prioritised; Emergency Department cases excluded

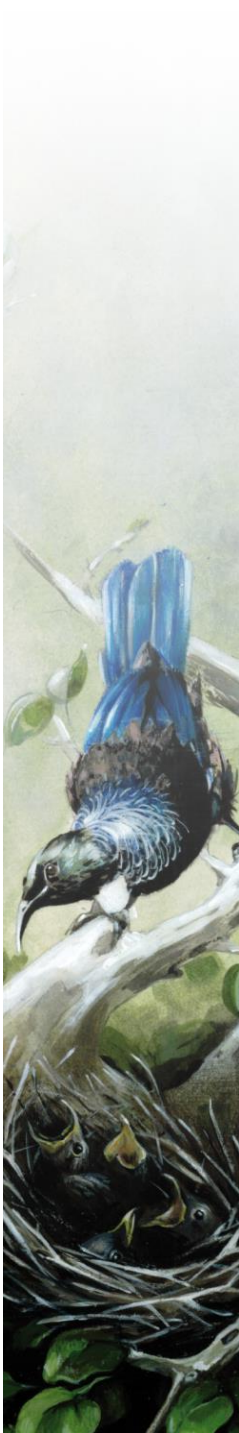
New Zealand Distribution by Ethnicity and Gender

During 2008–2012, hospital admissions for injuries arising from the assault, neglect or maltreatment of children were *significantly* higher for males. Rates were also *significantly* higher for Māori > Pacific > European/Other > Asian/Indian children (**Table 16**).

Table 16. Hospital Admissions for Injuries Arising from the Assault, Neglect or Maltreatment of Children 0–14 Years by Ethnicity and Gender, New Zealand 2008–2012

Admissions for Injuries Arising from Assault, Neglect or Maltreatment				
Children 0–14 Years				
Variable	Number: Annual Average	Rate per 100,000	Rate Ratio	95% CI
Ethnicity				
Asian/Indian	4.8	5.39	0.45	0.30–0.68
European/Other	58.8	12.03	1.00	
Māori	77.0	34.19	2.84	2.44–3.31
Pacific	20.6	23.21	1.93	1.54–2.42
Gender				
Female	60.4	13.89	1.00	
Male	100.8	22.05	1.59	1.38–1.83

Source: Numerator: National Minimum Dataset; Denominator: Statistics NZ Estimated Resident Population (projected from 2007); Note: Rate Ratios are unadjusted; Ethnicity is Level 1 Prioritised; Emergency Department cases excluded



Nature of the Injury Sustained

During 2008–2012, traumatic subdural haemorrhages and superficial head injuries were the most common injuries sustained as the result of the assault, neglect or maltreatment of children aged 0–4 years. For children aged 5–12 years head, upper limb and abdominal/lower back/pelvic injuries predominated (**Table 17**).

Table 17. Nature of Injuries Arising from the Assault, Neglect or Maltreatment in Hospitalised Children 0–12 Years by Age Group, New Zealand 2008–2012

Primary Diagnosis	Number: Total 2008–2012	Number: Annual Average	% of Total
Assault, Neglect or Maltreatment			
Children 0–4 Years			
Traumatic Subdural Haemorrhage	89	17.8	22.7
Superficial Head Injury	76	15.2	19.4
Fracture Skull or Facial Bones	19	3.8	4.8
Other Head Injuries	50	10.0	12.8
Injuries to Upper Limb	24	4.8	6.1
Injuries to Thorax (including Rib Fractures)	9	1.8	2.3
Injuries Abdomen, Lower Back and Pelvis	26	5.2	6.6
Fracture Femur	14	2.8	3.6
Other Injuries to Lower Limbs	12	2.4	3.1
Maltreatment	49	9.8	12.5
Other Injuries	24	4.8	6.1
Total	392	78.4	100.0
Children 5–12 Years			
Superficial Head Injury	32	6.4	16.7
Concussion	18	3.6	9.4
Fracture Skull or Facial Bones	14	2.8	7.3
Other Head Injuries	27	5.4	14.1
Injuries to Upper Limb	26	5.2	13.5
Injuries Abdomen, Lower Back and Pelvis	23	4.6	12.0
Injuries to Lower Limbs	13	2.6	6.8
Maltreatment	13	2.6	6.8
Other Injuries	26	5.2	13.5
Total	192	38.4	100.0

Source: National Minimum Dataset; Emergency Department cases excluded

Hospital Admissions for the Assault, Neglect or Maltreatment of Children 0–4 Years

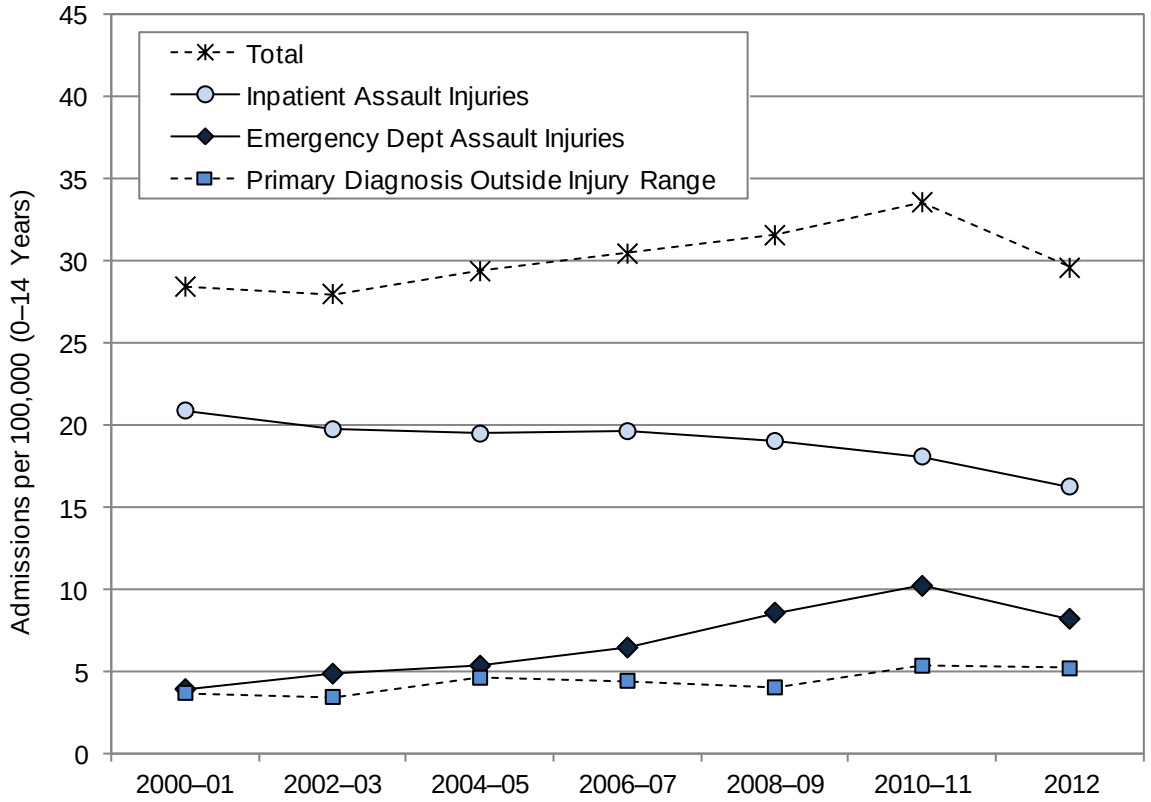
Background

While monitoring hospital admissions for injuries arising from assault, neglect or maltreatment provides insights into the number of children experiencing serious physical harm, it provides little information on those children experiencing less serious injuries, or whose main reason for admission was unrelated to a specific injury diagnosis. Further, it is unclear whether recent trends in assault admissions in children reflect a real decrease in children's risk of abuse, changes in the coding of hospital admission data, or changes in the way in which Emergency Departments (ED) and Paediatric Units manage the care of children deemed to be at risk of harm.

With these issues in mind, an analysis was undertaken of all hospital admissions in children aged 0–14 years, where an intentional injury (ICD-10-AM X85–Y09) code was identified in any of the first 10 external causes. This analysis included inpatient admissions, as well as those cases discharged directly from the ED, or with a primary diagnosis outside of the S00–T79 injury range. The key findings from this analysis were:

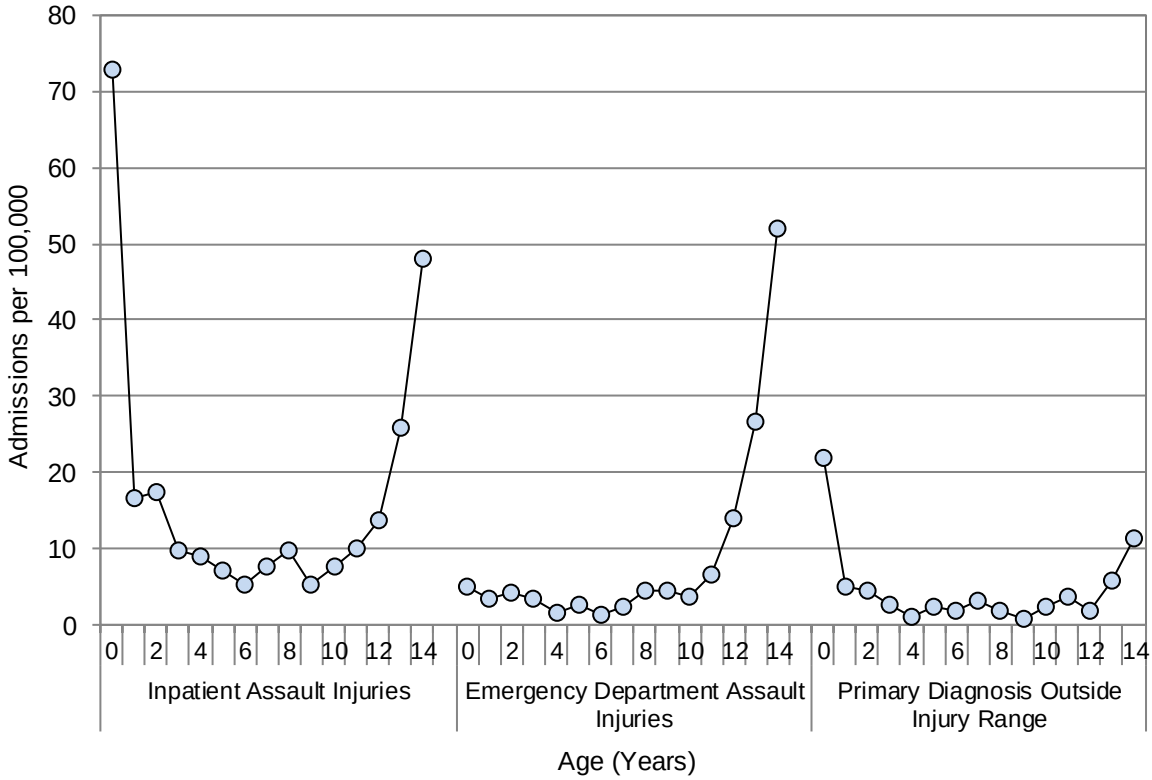
1. While inpatient injury admissions in children aged 0–14 years had declined during 2000–2012, ED discharges for assault-related injuries had increased, as had those admissions with an intentional injury external cause code and a primary diagnosis outside of the S00–T79 injury range (**Figure 47**).
2. The age distribution of inpatient admissions differed from those discharged from ED, with inpatient admissions being the most common in infants and those aged twelve years and over, while the majority of ED cases were in children aged twelve or more years. In contrast, a higher proportion of those with a primary diagnosis outside of the ICD-10-AM injury range were infants (**Figure 48**).

Figure 47. Hospital Admissions for Assault, Neglect and Maltreatment in Children Aged 0–14 Years by Admission Category, New Zealand 2000–2012



Source: Numerator: National Minimum Dataset; Denominator: Statistics NZ Estimated Resident Population (projected from 2007); Note: Emergency Department cases included

Figure 48. Hospital Admissions for Assault, Neglect and Maltreatment in Children Aged 0–14 Years by Age and Admission Category, New Zealand 2008–2012



Source: Numerator: National Minimum Dataset; Denominator: Statistics NZ Estimated Resident Population (projected from 2007)

Unfortunately little information was available on the context in which these assault-related injuries were occurring, making it difficult to determine whether the pattern of assaults changed as children grew older. For example, whether a greater proportion of assaults in young males aged 12–14 years arose from incidents with peers, rather than in the home environment. Further, around 20% of admissions with a non-injury related primary diagnosis had received a Z045 code (examination and observation following inflicted injury), while 12.3% had received a Z043 code (examination and observation following accident) and 4.7% a Z044 code (examination and observation following alleged rape and seduction), suggesting that many of these cases may have been similar to those admitted with a primary diagnosis in the S00–T79 injury range.

Thus, it was decided that a new child assault, neglect and maltreatment indicator should be created, which focused only on preschool aged children, in order to best capture those events likely to occur in the family/home environment. The breadth of the indicator was broadened however, to include not only inpatient admissions but also those discharged directly from ED, as well as those with a primary diagnosis outside of the ICD-10-AM S00–T79 injury range.

Data Source and Methods

Definition

1. Hospitalisations for the assault, neglect or maltreatment of children aged 0–4 years

Data Source

Numerator: National Minimum Dataset: Hospital admissions for children (0–4 years) with an external cause code of intentional injury (ICD-10-AM X85–Y09) in any of the first 10 External Cause codes. Both inpatient admissions and cases with an ED Specialty Code (M05–M08) on discharge are included in the analysis.

Denominator: NZ Statistics NZ Estimated Resident Population (projected from 2007)

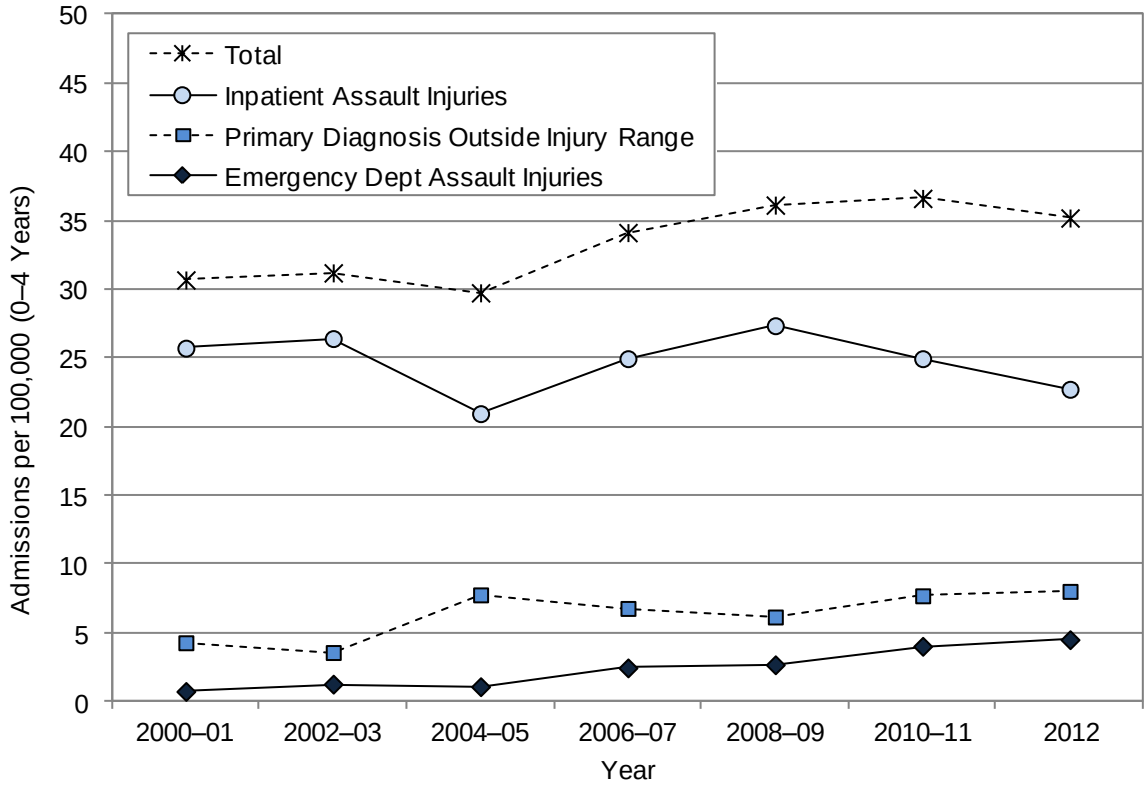
Interpretation

The limitations of the National Minimum Dataset are discussed at length in **Appendix 4**. The reader is urged to review this Appendix before interpreting any trends based on hospital admission data.

New Zealand Trends

During 2000–2012, inpatient admissions for injuries arising from the assault, neglect or maltreatment of children aged 0–4 years fluctuated, while assault related injuries that were managed in ED, and those with a primary diagnosis outside of the ICD-10 S00–T79 range gradually increased. Overall, admissions related to assault, neglect or maltreatment were relatively static during the early 2000s, but increased between 2004–05 and 2010–11, before declining slightly in 2012 (**Figure 49**).

Figure 49. Hospital Admissions for the Assault, Neglect or Maltreatment of Children 0–4 Years, New Zealand 2000–2012



Source: Numerator: National Minimum Dataset; Denominator: Statistics NZ Estimated Resident Population (projected from 2007)

Distribution by Primary Diagnosis

During 2008–2012, the most severe injuries were seen in children 0–4 years who were admitted as inpatients, with 22.7% of inpatient assault injury admissions being for traumatic subdural haemorrhages, and a further 4.8% being for fractures of the skull or facial bones. Of those children with injuries who were managed in ED, 21.8% had a superficial head injury, with a further 9.1% receiving a concussion. Of those with a primary diagnosis outside the ICD-10 S00–T79 injury range, 52.8% were admitted for observation, with the majority of these being observed following an inflicted injury or accident. A range of other respiratory and infectious diseases however, also contributed to admissions in this category (**Table 18**).

Distribution by Age and Gender

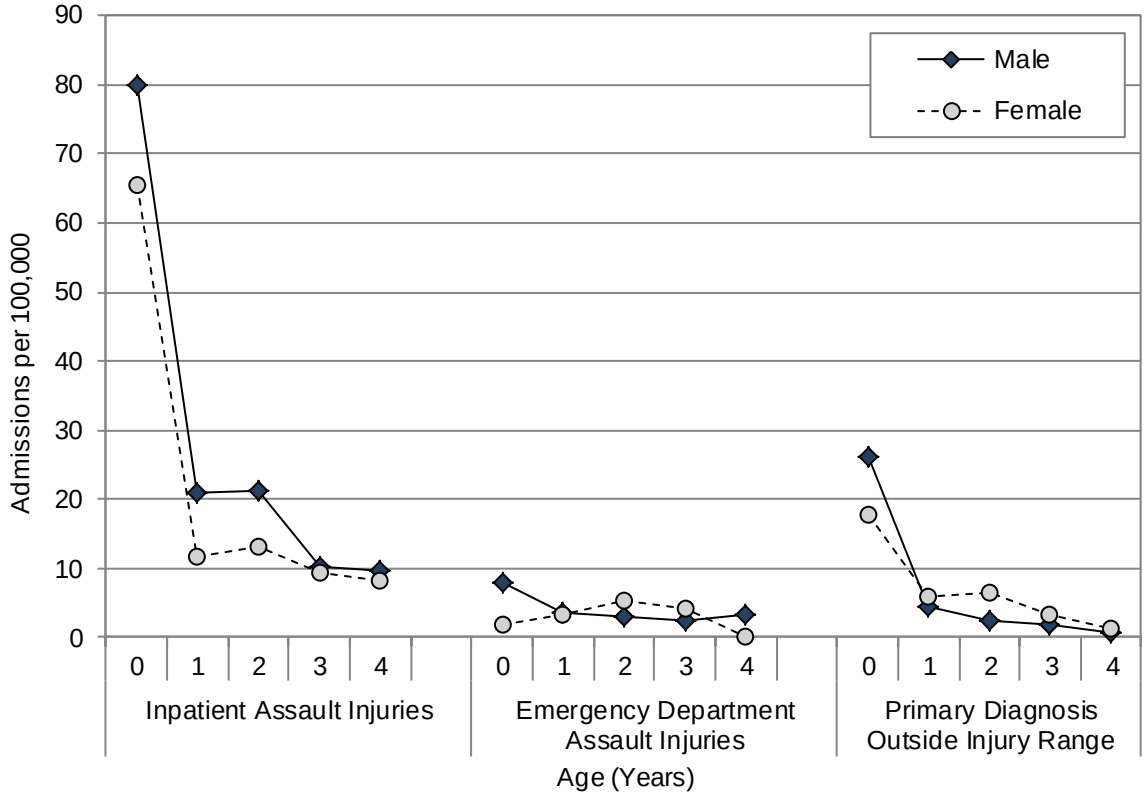
During 2008–2012, inpatient admissions for injuries arising from the assault, neglect or maltreatment of children, as well as those with a primary diagnosis outside of the ICD-10 S00–T79 injury range, were highest in infants aged less than one year, with rates then tapering off rapidly with increasing age. In contrast, assault related injuries managed in the ED were more evenly distributed across the first five years (**Figure 50**).

Table 18. Hospital Admissions for the Assault, Neglect or Maltreatment of Children 0–4 Years by Category and Primary Diagnosis, New Zealand 2008–2012

Primary Diagnosis	Number: Total 2008−2012	Number: Annual Average	% of Total
Children 0–4 Years			
Inpatient Assault Injuries			
Traumatic Subdural Haemorrhage	89	17.8	22.7
Superficial Head Injury	76	15.2	19.4
Fracture Skull or Facial Bones	19	3.8	4.8
Concussion	3	0.6	0.8
Other Head Injuries	47	9.4	12.0
Injuries to Upper Limb	24	4.8	6.1
Injuries to Thorax including Rib Fractures	9	1.8	2.3
Injuries Abdomen, Lower Back and Pelvis	26	5.2	6.6
Fracture Femur	14	2.8	3.6
Other Injuries to Lower Limbs	12	2.4	3.1
Maltreatment	49	9.8	12.5
Other Injuries	24	4.8	6.1
Total	392	78.4	100.0
Emergency Department Assault Injuries			
Superficial Head Injury	12	2.4	21.8
Concussion	5	1.0	9.1
Other Head Injuries	10	2.0	18.2
Injuries to Upper Limb	4	0.8	7.3
Injuries Abdomen, Lower Back and Pelvis	5	1.0	9.1
Injuries to Lower Limbs	5	1.0	9.1
Maltreatment	9	1.8	16.4
Other Injuries	5	1.0	9.1
Total	55	11.0	100.0
Primary Diagnosis Outside Injury Range			
Examination and Observation Following Inflicted Injury	31	6.2	28.2
Examination and Observation Following Accident	19	3.8	17.3
Examination and Observation for Other Specified Reasons	8	1.6	7.3
Respiratory Tract Infections	10	2.0	9.1
Skin Infections	5	1.0	4.5
Lack of expected normal physiological development	4	0.8	3.6
Gastroenteritis	3	0.6	2.7
Surgical Follow-up care	3	0.6	2.7
Meningitis	3	0.6	2.7
Other Infectious Diseases	3	0.6	2.7
Other Medical Conditions	16	3.2	14.5
Various Symptoms and Signs	5	1.0	4.5
Total	110	22.0	100.0

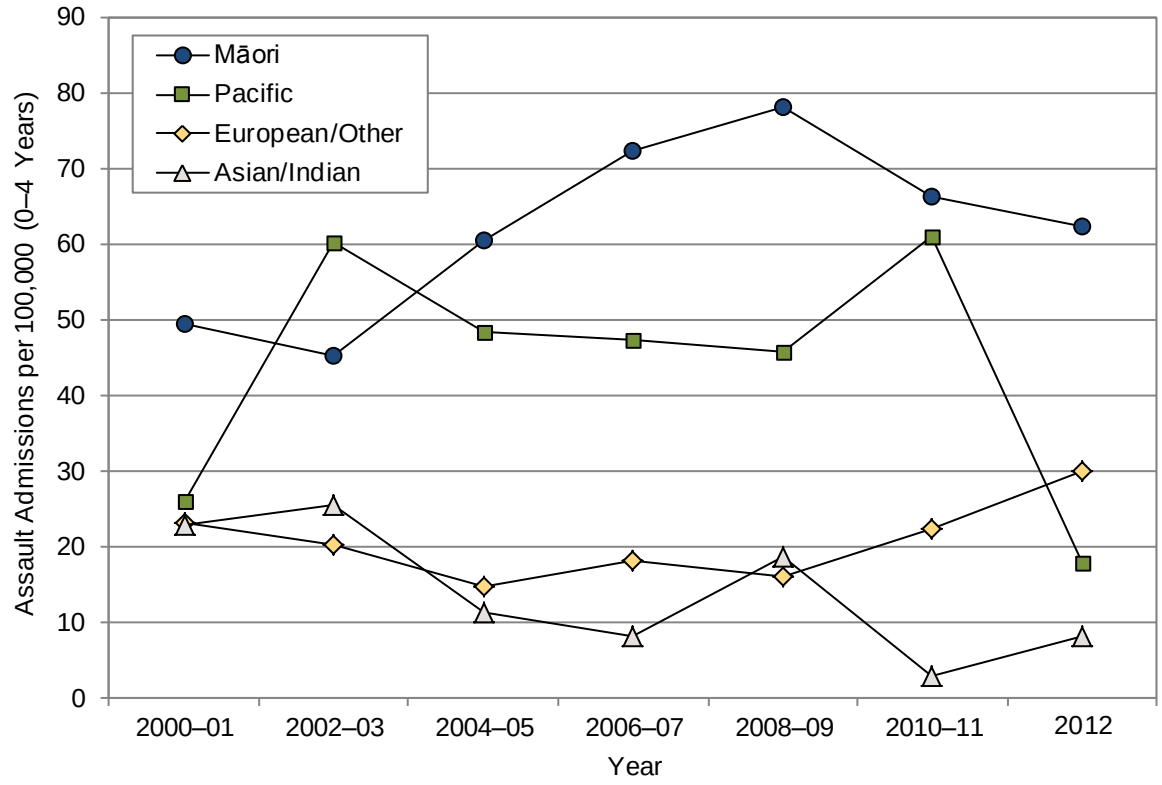
Source: National Minimum Dataset

Figure 50. Hospital Admissions for to the Assault, Neglect or Maltreatment of Children Aged 0–4 Years by Age and Gender, New Zealand 2008–2012



Source: Numerator: National Minimum Dataset; Denominator: Statistics NZ Estimated Resident Population (projected from 2007)

Figure 51. Hospital Admissions for the Assault, Neglect or Maltreatment of Children 0–4 Years by Ethnicity, New Zealand 2000–2012



Source: Numerator: National Minimum Dataset; Denominator: Statistics NZ Estimated Resident Population (projected from 2007); Note: Ethnicity is Level 1 Prioritised

Table 19. Hospital Admissions for the Assault, Neglect or Maltreatment of Children 0–4 Years by Ethnicity and Gender, New Zealand 2008–2012

Variable	Number: Annual Average	Rate per 100,000	Rate Ratio	95% CI	Variable	Number: Annual Average	Rate per 100,000	Rate Ratio	95% CI
Children 0–4 Years									
Total Assault, Neglect or Maltreatment Admissions									
Asian/Indian	3.2	9.73	0.46	0.27–0.76	Female	47.8	31.82	1.00	
European/Other	33.6	21.26	1.00		Male	63.6	40.20	1.26	1.07–1.49
Māori	59.8	70.02	3.29	2.73–3.98					
Pacific	14.8	46.17	2.17	1.65–2.85					
Inpatient Assault Injuries									
Asian/Indian	1.4	4.26	0.26	0.12–0.55	Female	32.8	21.84	1.00	
European/Other	26.0	16.45	1.00		Male	45.6	28.83	1.32	1.08–1.61
Māori	41.8	48.94	2.97	2.39–3.70					
Pacific	9.2	28.70	1.74	1.25–2.44					
Emergency Department Assault Injuries									
Asian/Indian	0.8	2.43	1.13	0.38–3.36	Female	4.4	2.93	1.00	
European/Other	3.4	2.15	1.00		Male	6.6	4.17	1.42	0.83–2.44
Māori	5.0	5.85	2.72	1.47–5.04					
Pacific	1.8	5.62	2.61	1.16–5.86					
Primary Diagnosis Outside Injury Range									
Asian/Indian	1.0	3.04	1.14	0.43–3.03	Female	10.6	7.06	1.00	
European/Other	4.2	2.66	1.00		Male	11.4	7.21	1.02	0.70–1.48
Māori	13.0	15.22	5.73	3.50–9.37					
Pacific	3.8	11.85	4.46	2.40–8.30					

Source: Numerator: National Minimum Dataset; Denominator: Statistics NZ Estimated Resident Population (projected from 2007); Note: Rate Ratios are unadjusted; Ethnicity is Level 1 Prioritised

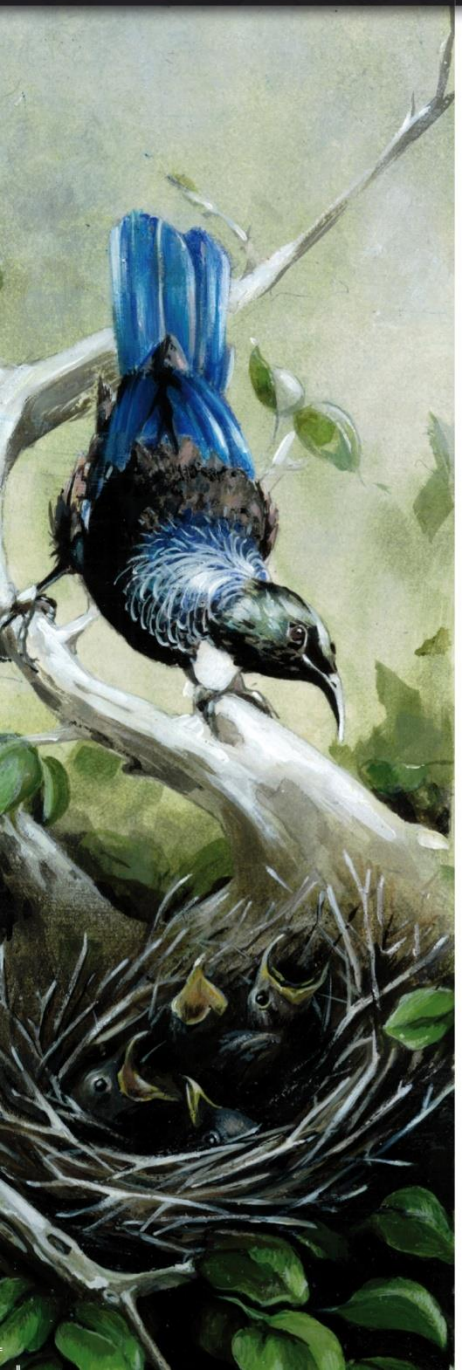
New Zealand Trends by Ethnicity

During 2000–2012, hospital admissions for assault, neglect or maltreatment were consistently higher for Māori and Pacific children aged 0–4 years, than for European/Other and Asian/Indian children. While large year to year variations (possibly as the result of small numbers) made trends difficult to interpret for most ethnic groups, for Māori children there was a reasonably consistent increase in rates between 2002–03 and 2008–09, which was followed by a decrease in rates during 2010–2012. Small numbers however, precluded a more detailed breakdown by admission category (**Figure 51**).

New Zealand Distribution by Ethnicity and Gender

During 2008–2012, hospital admissions for assault, neglect or maltreatment were *significantly* higher Māori and Pacific > European/Other > Asian/Indian children aged 0–4 years, and for males. When broken down by category, inpatient and ED assault injury admissions were also *significantly* higher for Māori and Pacific > European/Other > Asian/Indian children, while admissions with a primary diagnosis outside of the ICD-10 S00–T79 injury range were *significantly* higher for Māori and Pacific > Asian/Indian and European/Other children. Inpatient assault injury admissions were also *significantly* higher for males than for females, although gender differences in the other two categories did not reach statistical significance (**Table 19**).

APPENDICES AND REFERENCES



APPENDIX 1: METHODS USED TO DEVELOP THE NZ CHILDREN'S SOCIAL HEALTH MONITOR

This Report, which provides information on child poverty measures, economic indicators, and child health measures, builds on the NZ Children's Social Health Monitor so that the same data are still compiled and reported consistently.

This Appendix provides a brief overview of the methodology used to develop the original NZ Children's Social Health Monitor.

Rationale for the Children's Social Health Monitor

In response to deteriorating economic conditions in New Zealand and Australia in the late 2000s, a Working Group of health professionals from a range of organisations[2] with an interest in child health was formed in early 2009. Over the course of the year, this Working Group discussed the conceptualisation of an indicator set to monitor the impact of the recession on child wellbeing, the types of indicators which might be included, and the criteria by which individual indicators should be selected. As a result of these discussions, it was proposed that a Children's Social Health Monitor be developed, which comprised the following:

1. *A Basket of Indicators to Monitor Prevailing Economic Conditions:* Ideally, indicators would capture different facets of economic wellbeing (e.g. in a recession several quarters of negative growth (*GDP*) may precede upswings in Unemployment Rates, which in turn will influence the number of Children Reliant on Benefit Recipients.
2. *A Basket of Indicators to Monitor Children's Wellbeing:* Ideally indicators would respond relatively quickly (e.g. months to small number of years) to family's adaptations to deteriorating economic conditions (e.g. hospitalisations for poverty-related conditions) and would provide an overview of family wellbeing from a variety of different perspectives.

Indicator Selection Criteria

In selecting these indicators, it was decided that only routinely collected data sources which were of good quality, and which provided complete population coverage would be used, in order to ensure the indicator set was methodologically robust and could be consistently monitored over time. In order to achieve this aim, the Working Group developed a set of selection criteria, against which candidate indicators were scored. These selection criteria included:

Conceptual Criteria

Criteria for Indicators to Monitor Prevailing Macroeconomic Conditions

1. Internationally recognised and reported measure of economic performance/wellbeing
2. Should impact on at least one facet of children's wellbeing (i.e. the pathway(s) via which it impacts on children's wellbeing should be relatively well understood, or an association between the indicator and wellbeing documented in the literature)
3. Likely to change in response to a recession (i.e. months to small number of years)

Criteria for Indicators to Monitor Children's Health and Wellbeing

[2]The Paediatric Society of New Zealand, the Population Child Health Special Interest Group of the Royal Australasian College of Physicians, the New Zealand Child and Youth Epidemiology Service, TAHA (the Well Pacific Mother and Infant Service), the Māori SIDS Programme, the Kia Mataara Well Child Consortium, the New Zealand Council of Christian Social Services, and academics from the Universities of Auckland and Otago

1. The condition is likely to be influenced by family's physical adaptations to worsening economic conditions (e.g. saving on heating to pay for food, moving in with family to save on rent)
2. The condition is likely to be influenced by family's psychological adaptations to worsening economic conditions (e.g. increased family conflict in response to financial stress)
3. The condition exhibits a socioeconomic gradient (e.g. rates are higher in more deprived areas)
4. The condition is likely to respond to changing economic conditions in the short to medium term (e.g. months to 1–2 years)

Data Quality Criteria

Data Quality Criteria (for either of the above indicator categories)

1. Needs to be routinely collected
2. Available at the national level (i.e. complete coverage of target population)
3. Updated at least annually (although quarterly preferable)
4. Availability of consistent time series data going back several years (i.e. standard and stable method of data collection)
5. Distribution can be broken down by e.g. ethnicity, socioeconomic status, region

Selection of the Baseline Indicator Set

In mid-2009 a long list of candidate indicators (selected by means of a scan of the available literature, email consultation with child health networks, and the suggestions of Working Group members) were then scored against each of these criteria by Working Group members and other health professionals (n=20). Those scoring the indicators were also asked to select a Top Five Economic and Top Five Health and Wellbeing Indicators for inclusion in the Children's Social Health Monitor. The resulting Top Five Economic and Wellbeing indicators (as determined both by criteria scoring and priority ranking) were:

Economic Indicators:

Gross Domestic Product
Income Inequality
Child Poverty
Unemployment Rates
The Number of Children Reliant on Benefit Recipients

Child Health and Wellbeing Indicators:

Hospital Admissions with a Social Gradient
Mortality with a Social Gradient
Infant Mortality
Hospital Admissions and Mortality from Non-Accidental Injury
Ambulatory Sensitive Hospital Admissions

Methodology for Developing the Hospital Admissions and Mortality with a Social Gradient Indicator

While all of the Top Five Economic Indicators, and a number of the Child Health and Wellbeing indicators already had established methodologies, the hospital admissions and mortality with a social gradient indicator had to be developed specifically for the Children's Social Health Monitor. The methodology used to develop this indicator is outlined below:

Hospital Admissions
In considering which conditions should be included in the analysis of hospital admissions with a social gradient, the 40 most frequent causes of hospital admission in children aged 0–14 years (excluding neonates) were reviewed, and those exhibiting a social gradient (a rate ratio of ≥1.8 for NZDep deciles 9–10 vs. deciles 1–2; or for Māori, Pacific or Asian vs. European children) were selected. A small number of conditions with rate ratios in the 1.5–1.8 range were also included, if they demonstrated a consistent social gradient (i.e. rates increased in a stepwise manner with increasing NZDep deprivation) and the association was biologically plausible (the plausibility of the association was debated by Working Group members).

Inclusion and Exclusion Criteria
Neonatal hospital admissions (<29 days) were excluded on the basis that these admissions are more likely to reflect issues arising prior to/at the time of birth (e.g. preterm infants may register multiple admissions as they transition from intensive care (NICU) → special care nurseries (SCBU) → the postnatal ward), and respiratory infections/other medical conditions arising in these contexts are likely to differ in their aetiology from those arising in the community.

For medical conditions, only acute and arranged hospital admissions were included, as Waiting List admissions are likely to reflect service capacity, rather than the burden of health need (e.g. the inclusion of Waiting List admissions would result in a large number of children with otitis media and chronic tonsillitis (who were being admitted for grommets and tonsillectomies) being included, and the demographic profile of these children may be very different from children attending hospital acutely for the same conditions).

For injury admissions, filtering by admission type was not possible, as a number of DHBs admitted injury cases under (now discontinued) ACC admission codes, making it difficult to distinguish between acute and waiting list admissions in this context. In accordance with other reports produced by the NZ Child and Youth Epidemiology Service (NZCYES), all injury cases with an Emergency Department Specialty Code (M05–M08) on discharge were excluded as a result of inconsistent uploading of Emergency Department cases across DHBs (see **Appendix 4** for further detail). This differential filtering however means that it is not possible to accurately compare the magnitude of the social gradients between the medical condition and injury categories, as they were derived using different methodologies (and social differences in Emergency Department vs. primary care attendances for minor medical conditions may have accounted for some of the social gradients seen). No such differential filtering occurred for mortality data, however (see below), and thus the magnitude of the social differences seen in this context is more readily comparable.

Mortality
In the case of mortality, because in many instances, the number of deaths from a particular condition was insufficient to calculate reliable rate ratios by NZDep and ethnicity, the rate ratios derived from the analysis of hospital admission data were used to denote category membership. The most frequent causes of mortality in those 0–14 years (excluding neonates) were reviewed however, in order to ensure that no additional conditions making a large contribution to mortality had been missed by the analysis of hospital admission data. This identified two further conditions (which by analysis of mortality of data met rate ratio criteria); deaths from drowning and Sudden Unexpected Death in Infancy, which were then included in the coding algorithms (for both hospital admissions and mortality data). A number of deaths were also identified, which were attributed to issues arising in the perinatal period (e.g. extreme prematurity, congenital anomalies), but in order to preserve consistency with previous exclusion criteria (i.e. the exclusion of conditions arising in the perinatal period) these were not included in coding algorithms.

In Conclusion

While it is hoped that over time this indicator set will be expanded and further refined, it is intended that the NZ Child and Youth Epidemiology Service will monitor this core minimum indicator set on an annual basis, until the economic position of New Zealand children improves appreciably.

APPENDIX 2: DIAGNOSTIC SHIFTS IN CODING

In New Zealand, the Ministry of Health regularly updates the ICD-10-AM coding system it uses to assign diagnostic codes, in order to ensure New Zealand remains congruent with international best practice. As a consequence, since 2000 New Zealand's national health collections have sequentially used the ICD-10-AM 1st, 2nd, 3rd and 6th Editions, with the 6th Edition being in use since 1 July 2008 [46].

While the Technical Report's coding algorithms take such Edition changes into account, what is often harder to identify is changes in the way the codes themselves are assigned, either as a result of new directives to clinical coders on how to document specific conditions, or due to changes in the way clinicians diagnose clinically overlapping, ambiguous, or emerging conditions. In this Technical Report, two changes have been made to the coding algorithms previously used by the CSHM to define medical conditions with a social gradient, as a result of these issues. Specifically these changes relate to:

The Broadening of Asthma to Asthma and Wheeze

In recent years there has been a move away from diagnosing asthma in pre-school age children, with the majority of a European Respiratory Society Taskforce in 2008 "*agreeing not to use the term asthma to describe preschool wheezing illness, since there is insufficient evidence to show that the pathophysiology of preschool wheezing illness is similar to that of asthma in older children [33]".*

Figure 52 shows the large increases in hospital admissions with a primary diagnosis of wheeze (R062) that have occurred in New Zealand since this time, with almost all of these increases being in preschool aged children (0–4 years). A corresponding fall in the number of children admitted with asthma (J45–J46) has also occurred during 2010–2012, with the largest changes again being seen in pre-school age children.

As a consequence, in this year's Technical Report, Asthma (J45–J46) has been replaced with a new category, Asthma and Wheeze (J45–J46, R062), in order to minimise the impacts of this probable diagnostic shift on time series analysis.

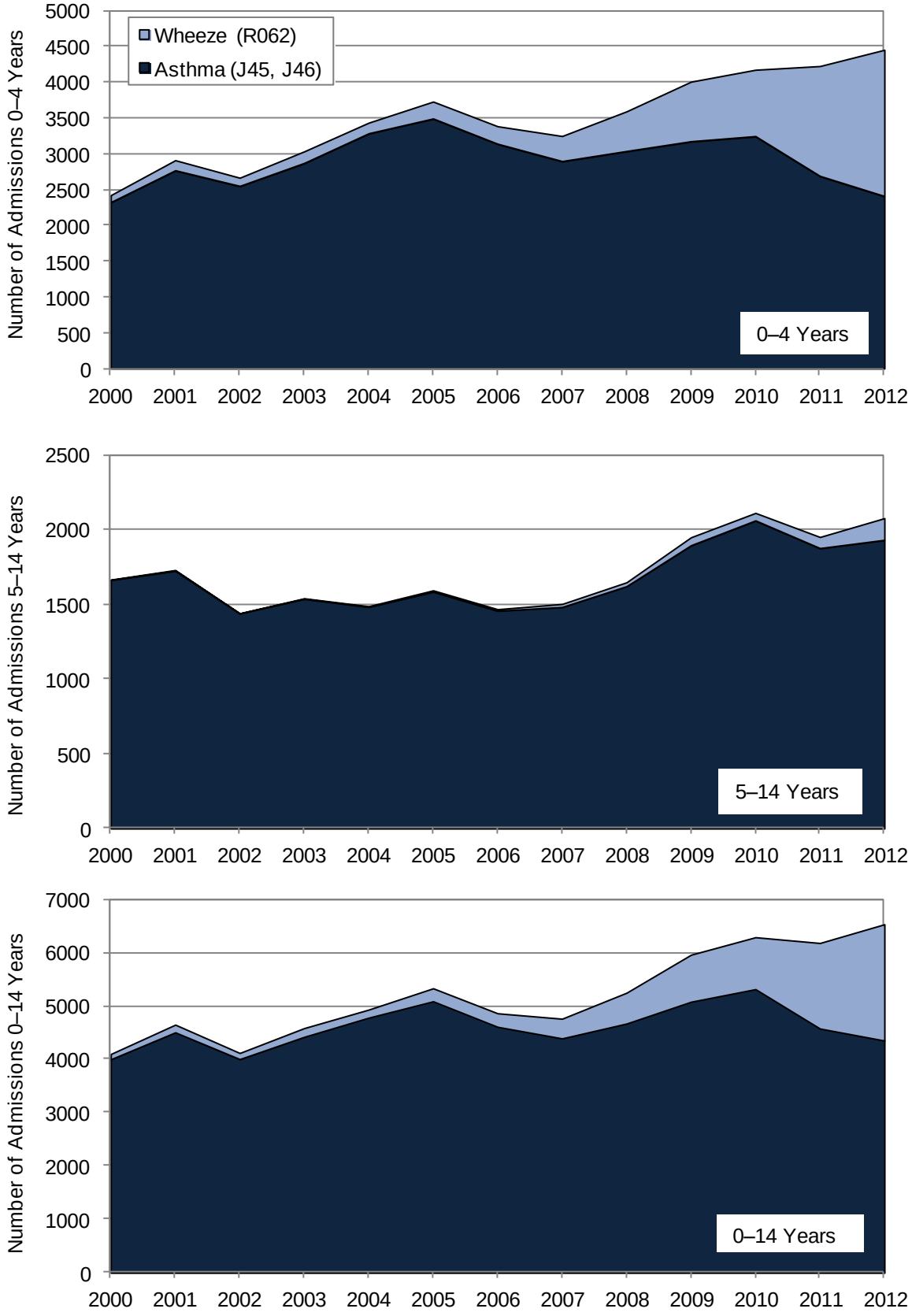
The Addition of J22 (Unspecified Lower Respiratory Infections)

J22 was not initially included in the CSHM's coding algorithms, as it was not present in ICD-9, and thus could not be used in time series analyses prior to 2000. However, there are considerable clinical similarities between J22 (Unspecified Lower Respiratory Tract Infection) and J18.9 (Unspecified Pneumonia), a code which accounts for the majority of admissions in the Monitor's current Bacterial/Non-Viral/Unspecified Pneumonia category.

Whether this diagnostic overlap has resulted in any actual diagnostic transfer between these categories remains unclear, although the number of admissions with a primary diagnosis of J22 has increased since 2007, while the number with Bacterial/Non-Viral/Unspecified Pneumonia has declined since 2009 (**Figure 53**).

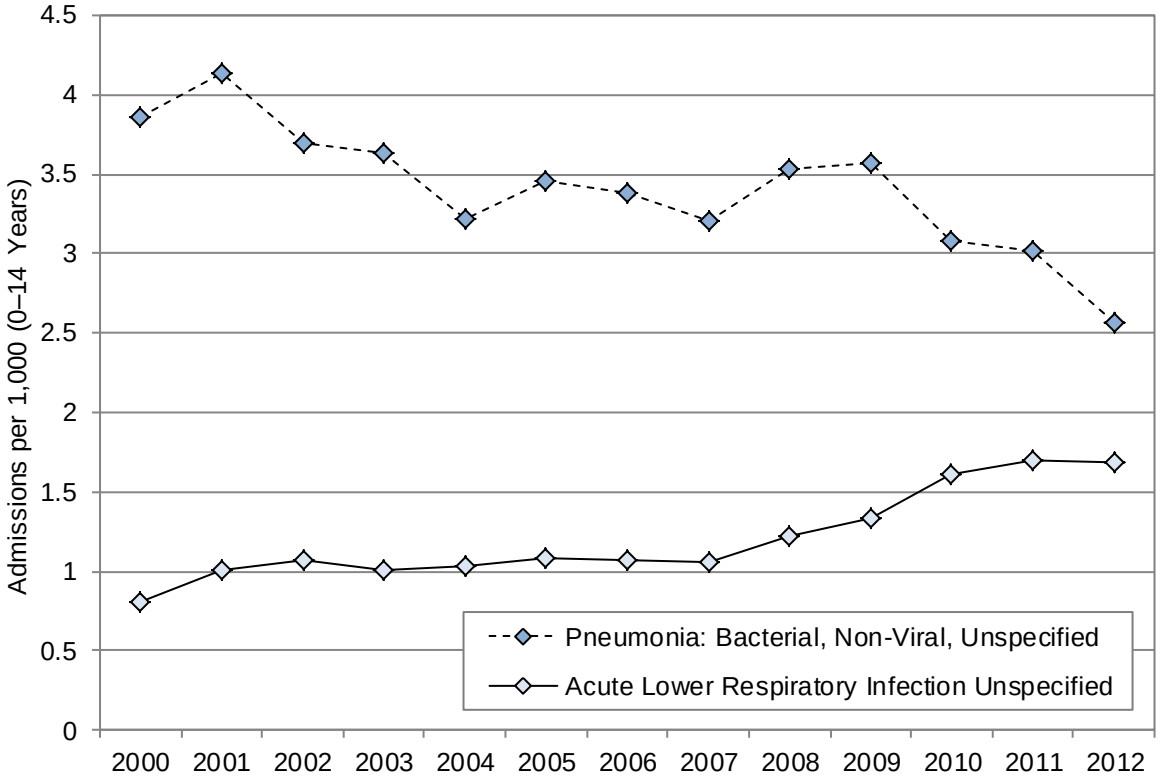
Given this uncertainty, the code J22 has been added to the Technical Report's coding algorithms. As a result, the rates presented in this report are not directly comparable to those previously presented in the CSHM.

Figure 52. Diagnostic Shifts in the Coding of Asthma and Wheeze by Age Group for Children Aged 0–14 Years, New Zealand 2000–2012



Source: National Minimum Dataset

Figure 53. Hospital Admissions for Bacterial/Non-Viral/Unspecified Pneumonia and Acute Unspecified Lower Respiratory Infections in Children Aged 0–14 Years, New Zealand 2000–2012



Source: Numerator: National Minimum Dataset (neonates removed); Denominator: Statistics NZ Estimated Resident Population (projected from 2007); Acute and arranged admissions only

APPENDIX 3: STATISTICAL SIGNIFICANCE TESTING AND ITS USE IN THIS REPORT

Understanding Statistical Significance Testing

Inferential statistics are used when a researcher wishes to use a sample to draw conclusions about the population as a whole (e.g. weighing a class of 10 year old boys, in order to estimate the average weight of all 10 year old boys in New Zealand). Any measurements based on a sample, however, even if drawn at random, will always differ from that of the population as a whole, simply because of chance. Similarly, when a researcher wishes to determine whether the risk of a particular condition (e.g. lung cancer) is truly different between two groups (smokers and non-smokers), they must also consider the possibility that the differences observed arose from chance variations in the populations sampled.

Over time, statisticians have developed a range of measures to quantify the uncertainty associated with random sampling error (e.g. to quantify the level of confidence we can have that the average weight of boys in our sample reflects the true weight of all 10 year old boys, or that the rates of lung cancer in smokers are really different to those in non-smokers). Of these measures, two of the most frequently used are:

P values: The p value from a statistical test tells us the probability that we would have seen a difference at least as large as the one observed, if there were no real differences between the groups studied (e.g. if statistical testing of the difference in lung cancer rates between smokers and non-smokers resulted in a p value of 0.01, this tells us that the probability of such a difference occurring if the two groups were identical is 0.01 or 1%. Traditionally, results are considered to be statistically significant (i.e. unlikely to be due to chance) if the probability is <0.05 (i.e. less than 5%) [47].

Confidence Intervals: A 95% Confidence Interval suggests that if you were to repeat the sampling process 100 times, 95 times out of 100 the confidence interval would include the true value. In general terms, if the 95% confidence intervals of two samples overlap, there is no significant difference between them (i.e. the p value would be ≥0.05), whereas if they do not overlap, they can be assumed to be statistically different at the 95% confidence level (i.e. the p value would be <0.05) [47].

The Use of Statistical Significance Testing in this Report

In the preparation of this report a large range of data sources was used. For the purposes of statistical significance testing, however, these data sources can be considered as belonging of one of two groups: Population Surveys and Routine Administrative Datasets. The relevance of statistical testing to each of these data sources is described separately below:

Population Surveys: A number of indicators in this report utilise data derived from national surveys (e.g. the 2009 New Zealand Tobacco Use Survey), where information from a sample has been used to make inferences about the population as a whole. In this context statistical significance testing is appropriate, and where such information is available in published reports, it has been incorporated into the text accompanying each graph or table. In a small number of cases, however, information on statistical significance was not available in published reports, and in such cases any associations described do not imply statistical significance.

Numbers and Rates Derived from Routine Administrative Data: A large number of the indicators in this report are based on data derived from New Zealand's administrative datasets (e.g. National Minimum Dataset, National Mortality Collection), which capture information on all of the events occurring in a particular category. Such datasets can thus be viewed as providing information on the entire population, rather than a sample and as a

consequence, 95% confidence intervals are not required to quantify the precision of the estimate (e.g. the number of leukaemia deaths in 2003–2007 although small, is not an estimate, but rather reflects the total number of deaths during this period). As a consequence, 95% confidence intervals have not been provided for any of the descriptive data (numbers, proportions, rates) presented in this report, on the basis that the numbers presented are derived from the total population under study.

Rate Ratios Derived from Routine Administrative Data: In considering whether statistical significance testing is ever required when using total population data Rothman [48] notes that if one wishes only to consider descriptive information (e.g. rates) relating to the population in question (e.g. New Zealand), then statistical significance testing is probably not required (as per the argument above). If, however, one wishes to use total population data to explore biological phenomena more generally, then the same population can also be considered to be a sample of a larger super-population, for which statistical significance testing may be required (e.g. the fact that SUDI in New Zealand is 5 times higher in the most deprived (NZDep deciles 9–10) areas might be used to make inferences about the impact of the socioeconomic environment on SUDI more generally (i.e. outside of New Zealand, or the 5 year period concerned)). Similarly, in the local context the strength of observed associations is likely to vary with the time period under study (e.g. in updating 5-year asthma admission data from 2004–2008 to 2006–2010, rate ratios for Pacific children are likely to change due to random fluctuations in annual rates, even though the data utilised includes all admissions recorded for that particular 5-year period). Thus in this report, whenever measures of association (i.e. rate ratios) are presented, 95% confidence intervals have been provided on the assumption that the reader may wish to use such measures to infer wider relationships between the variables under study [48].

The Signalling of Statistical Significance in this Report

In order to assist the reader to identify whether tests of statistical significance have been applied in a particular section, the statistical significance of the associations presented has been signalled in the text with the words *significant*, or *not significant* in italics. Where the words *significant* or *not significant* do not appear in the text, then the associations described do not imply statistical significance or non-significance.

APPENDIX 4: THE NATIONAL MINIMUM DATASET

Introduction

The National Minimum Dataset (NMDS) is New Zealand's national hospital discharge data collection and is maintained by the Ministry of Health (the Ministry). The information contained in the dataset has been submitted by public hospitals in a pre-agreed electronic format since 1993. Private hospital discharges for publicly funded events (e.g. births, geriatric care) have been submitted electronically since 1997. The NMDS was implemented in 1993, and contains public hospital information from 1988 [46]. Information in the NMDS includes principal and additional diagnoses, procedures, external causes of injury, length of stay and sub-specialty codes; and demographic information such as age, ethnicity and usual area of residence.

The NMDS is useful for monitoring children's hospital admissions, predicting future health service demand, and planning new services and interventions. However, there are a number of issues to take into account when interpreting information from the NMDS. Many of these issues arise from regional differences in the way data are reported to, or coded in, the NMDS. These include:

1. Differences in the way DHBs report their Emergency Department (ED) cases to the NMDS and how this has changed over time.
2. The changeover from the ICD-9 to ICD-10 coding system and irregularities in the way in which diagnoses and procedures are allocated ICD codes.
3. Changes in the way ethnicity information has been recorded over time.

This Appendix considers the first two issues, while the third is considered in **Appendix 7**, which reviews the way ethnicity information is collected and coded in the health sector.

1. Differences in the Reporting of ED Cases to the NMDS

Historically there have been differences in the way DHBs have reported their ED events to the NMDS, which pose challenges for the interpretation of hospital admission data. This section provides a brief overview of how DHBs have been reporting their ED cases to the NMDS, as well as the different settings DHBs use to assess children presenting acutely with medical conditions. The rationale for the NZ Child and Youth Epidemiology Service's (NZCYES) approach to the analysis of hospital admissions is then presented before the potential impacts of inconsistent reporting of ED cases to the NMDS on trends in hospital admissions for children are considered.

Defining Hospital Admissions

In New Zealand, a hospital admission is defined as a hospital event with a treatment time of more than three hours (this is referred to as the three hour rule). Treatment time is counted from when the patient first sees the doctor (or other health professional) rather than when they first arrive in ED [49].

Admissions that meet the three hour rule are sometimes subdivided into: day cases (or day patients) where the patient is admitted and discharged (routinely/alive) on the same day, and inpatient events where the patient spends at least one (mid)night in hospital [50]. Other DHBs, however, include all cases meeting the three hour rule in their definition of an inpatient event (personal communication Ministry staff).

Note: Throughout this report, the term hospital admission has been used in preference to hospital discharge in the description of child hospitalisation.

Regional Differences in the Reporting of ED Cases

Regional variations in the way DHBs report their ED day cases to the NMDS include the following:

1. During the mid-1990's, the Starship Children's Hospital (which provided inpatient services to the Auckland and Waitemata DHBs) started reporting ED events if the total time in the ED (including waiting time) exceeded 3 hours rather than reporting only ED events where treatment time exceeded 3 hours [50]. Following advice from the Ministry this practice ceased in January 2005. However, it took several years for the hospital to begin reporting its ED cases consistently again as changes in recording practice (i.e. recording the time of first treatment by a doctor rather than time of first triage) took time to implement. This resulted in large variations in rates in the Auckland and Waitemata DHBs during the mid-1990s to early 2000s.
2. In a number of DHBs, ED cases have been assigned the health specialty code of the consulting doctor on discharge, even though the patient was discharged directly from ED (e.g. a child with a fracture seen by an orthopaedic registrar in ED receiving an orthopaedic specialty code instead of an ED one). This practice has varied both over time and by region and makes the identification of ED cases using the health specialty code on discharge difficult. A separate ED identifier code was introduced in 2007, but adoption by DHBs has been variable (personal communication Ministry staff).
3. The way DHBs manage the assessment of paediatric medical cases also varies around the country. In the large Auckland DHBs, the majority of children can access acute paediatric care via specialist paediatric EDs, which are staffed by specialist paediatric staff. In other parts of the country, children are either assessed in paediatric assessment units (PAUs, often attached to the paediatric ward), or sent to the general paediatric ward for review. During 2008–2012, the proportion of admissions for medical conditions with a social gradient receiving an ED specialty code varied markedly by DHB. It was highest in the large Auckland DHBs (range 25%–50%) which see the majority of their children in specialist paediatric EDs, and lowest in those DHBs that assess most children on the paediatric ward (e.g. 0%–7% in some smaller DHBs).
4. Analysis of medical day cases (where the child is admitted and discharged the same day) also suggest that many non-Auckland DHBs were assessing these cases in a non-ED setting and assigning them a paediatric medical specialty code on discharge, rather than simply failing to report their ED cases to the NMDS. In an analysis of 2008–2012 data, over 85% of day case admissions for medical conditions with a social gradient in the South Island had a non-ED specialty code on discharge, as compared to only 10% in the Auckland DHB.
5. While the three hour rule has remained unchanged, to address inconsistency, the Ministry implemented a new directive in July 2009 that made it mandatory for DHBs to report ED cases meeting the three hour rule. While most DHBs (including all of the Auckland DHBs and many medium sized and smaller DHBs) were reporting their ED cases consistently prior to this time or do not appear to have changed their practice during the past decade, in a small number of DHBs there was an abrupt increase in the reporting of ED cases from 2009. In most cases, the number of additional cases reported was relatively modest, however the staggered increase in reporting from 2009 resulted in a gradual increase in the number of admissions in subsequent years.

The Ministry's Approach to Inconsistent ED Reporting

To minimise the impact of the inconsistent reporting of ED cases, the Ministry utilises a set of filters that aim to create comparability between regions, and over time, when analysing trends in hospital admission data. While these filters vary with the work being undertaken, the majority exclude short stay ED events. For example:

1. In its Hospital Throughput Reports [51], the Ministry excluded all cases where: the admission and discharge date were the same (length of stay = 0), AND the patient was discharged alive, AND the health specialty code on discharge was Emergency Medicine (M05, M06, M07, and M08).
2. In a review of hospitalisations for intentional self-harm [52], the Ministry excluded all hospital admissions with a health specialty code on discharge of Emergency Medicine (M05, M06, M07, and M08) AND a length of stay of less than two days.
3. When monitoring ambulatory sensitive hospital admissions, the Ministry has traditionally excluded all ED short stay cases from its analysis (personal communication Ministry staff).

Limitations of the Ministry's ED Filters in the Paediatric Context

For children's medical admissions however, excluding all ED day cases from the analysis is problematic as:

1. The desire to manage children in a developmentally appropriate healthcare environment that is separate from sick adults [53] has led to a plurality of acute assessment practices around the country. As previously discussed, this includes the use of specialist paediatric emergency departments in larger centres, PAUs attached to children's wards in many regional centres, and the fast tracking of children to the general paediatric ward in some smaller DHBs. Applying the Ministry's ED day case filters in this context excludes a high proportion of the workload of the three Auckland DHBs that assess much of their acute caseload in the specialist ED setting. However, the same filters include the workload of those DHBs that undertake similar acute assessments in a ward based setting. When ED cases are excluded, paediatric admissions for medical conditions with a social gradient in the Waitemata and Auckland DHBs fall well below those of New Zealand's other DHBs.
2. The majority of medical admissions in children are for acute onset infectious and respiratory diseases of relatively short duration. Exclusion of those with a length of stay of 0 days (as per some Ministry filters) means that those children who begin their treatment late at night and are discharged in the early hours of the following morning are included as hospital admissions, whereas those who begin their treatment in the morning and are discharged in the evening are excluded, even though they may have a similar or longer length of stay. (Note: Some Ministry filters exclude admission with a length of stay of 0 or 1 day in an attempt to address this issue).
3. Historically, concerns have been expressed about the high costs of after-hours primary care [54], with some families potentially bypassing after hours services in favour of the ED, which is free. Analysis of children's ED presentations for minor medical conditions may be one way of monitoring improvements/emergent barriers in family's access to primary care (particularly in those DHBs which have been reporting their ED cases to the NMDS consistently over time). The exclusion of ED cases from time series analysis however, precludes the identification of emerging concerns in this area.

NZCYES' Approach to the Analysis of Hospital Admission Data

Given the plurality of approaches (specialist ED, PAU, general paediatric ward) to the assessment of children requiring acute paediatric care, the NZCYES has from the outset chosen to include all ED day cases in its analysis of hospital admissions for medical conditions. The NZCYES believes that this provides the best comparison of the workload of DHBs of differing sizes around the country. However, in light of its concerns about inconsistencies in the reporting of ED cases to the NMDS, the NZCYES has always included an appendix in its reports to alert readers to these issues so that trend data can be interpreted with these concerns in mind.

For injuries, the NZCYES has adopted the Ministry's practice of filtering out ED cases based on the hypothesis that the processes for injury assessments is relatively consistent around the country (e.g. children presenting to ED with a fracture may be more likely to be assessed by ED staff, or by an orthopaedic registrar in ED, than to be sent to the ward for paediatric review). On this basis, filtering out ED cases is less likely to disproportionately discount the workload of the Auckland DHBs.

Further research is required to confirm this hypothesis. However, analysis of hospital admission data for 2008–2012 found that excluding ED cases resulted in paediatric medical admission rates in the Auckland and Waitemata DHBs being much lower than those of other DHBs. Including these cases resulted in rates that were somewhat higher. In contrast, for injuries, exclusion of ED cases resulted in admission rates that were a little lower than the NZ rate, whereas the inclusion of ED cases resulted in rates that were much higher. One possible interpretation of these differences is that the exclusion of ED cases in the context of injury admissions may not disproportionately discount the work of the large Auckland DHBs to the same extent as it does for medical admissions.

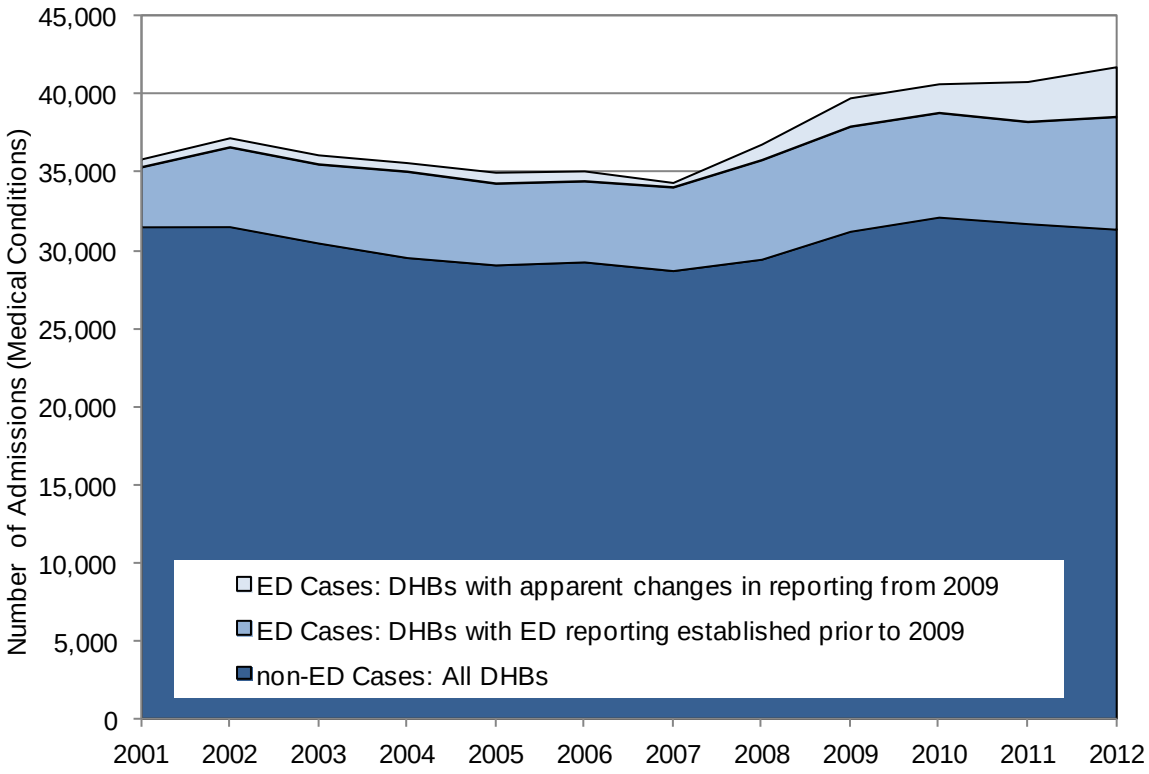
Implications for Interpretation

While the inclusion of ED cases is thought to provide the most meaningful comparison across DHBs, it has a number of implications for time series analysis. **Figure 54** shows trends in children's hospital admissions for medical conditions with a social gradient during 2001–2012. In this figure, admissions have been broken into three groups: 1) non-ED cases (e.g. those discharged with a paediatric medical/surgical specialty code); 2) ED cases in DHBs that consistently reported their ED cases prior to 2009 or where reporting did not change in or after 2009; 3) ED cases in DHBs where an abrupt increase in reporting was evident in or after 2009. Analysis suggests that:

- In the early 2000s, the correction of the historical under-reporting of ED cases by a number of Auckland and Upper North Island DHBs may have contributed to the increase in hospital admissions for medical conditions between 2000 and 2002.
- During 2002–2007, the declines seen in medical admissions may have been greater, had not a number of small to medium sized DHBs begun to report their ED cases more comprehensively.
- Since 2009, the correction of the under-reporting occurring in the remaining DHBs may have contributed to some of the rise seen in ED admissions. This in turn may have steepened the rate of increase in overall admissions seen during 2009-2012.
- Between 2007 and 2012, non-ED admissions and ED admissions in DHBs already reporting their ED cases consistently, rose from 34,054 to 38,608 (an increase of 4,554) while ED admissions in DHBs who appeared to change their reporting practices from 2009 rose from 271* to 3,206 (an increase of 2,935) (*2007 was an unusually low year due to a reporting anomaly in one DHB, with admissions averaging around 500-600 per year in the years immediately prior to 2007).
- It is difficult to determine how much of the increase in ED admissions in DHBs who changed their ED reporting practices in or after 2009, was due to the change in reporting practice and how much was due to a real rise in ED presentations. However,

if the rate of increase in ED admissions during 2007–2012 for DHBs who did not change practice was applied to the DHBs that did, an additional 490 admissions might have been expected during this period. This is much lower than the 2,935 additional admissions seen (a net excess of 2,445 admissions).

Figure 54. Hospital Admissions for Medical Conditions with a Social Gradient in Children Aged 0–14 Years by Health Specialty on Discharge and DHB Reporting Practice, New Zealand 2000–2012



Source: National Minimum Dataset; Acute and Arranged Admissions only; ED cases are those with a health speciality code on discharge of M05–M08.

Other potential limitations to take into account when interpreting NMDS data include:

1. The inclusion of ED medical cases may lead to apparently higher admission rates for DHBs that have been reporting all of their ED cases consistently over time or that have been including triage or waiting time in the calculation of the three hour rule, when compared to DHBs that have been under-reporting their ED caseload. However, the extent to which these ED cases have been undercounted is difficult to quantify with many DHBs managing their acute assessments via PAUs or the paediatric ward. As a result, many acute assessments are assigned a M55 Paediatric Medicine specialty code on discharge (as there is no specific code for PAU) making them indistinguishable from other paediatric ward admissions.
2. Conversely, filtering out injury ED cases may have led to apparently lower injury admission rates in those DHBs who manage a higher proportion of their caseload in ED. Further, the resultant injury data are no longer representative of all types of injury presentation in children as they reflect only the more serious end of the spectrum. Finally, the filtered data are unable to provide any insights into changes in families' service access patterns (e.g. primary care vs. ED) for less serious injuries in children, thereby losing its capacity to provide an early warning of a shift in families health seeking behaviour for minor injuries.

2. Data Quality and Coding Changes over Time (ICD-9 and ICD-10)

Change Over from ICD-9 to ICD-10 Coding

From 1988 until June 1999, clinical information in the NMDS was coded using versions of the ICD-9 classification system (ICD-9 CM until June 1995, then ICD-9-CM-A until June 1999). From July 1999 onwards, the ICD-10-AM classification system has been used, although for time series analysis, back and forward mapping between the two systems is possible using pre-defined algorithms [55].

The introduction of ICD-10-AM represented the most significant change in the International Classification of Diseases (ICD) in over 50 years and uses an alphanumeric coding system for diseases in which the first character of the code is always a letter followed by several numbers. This has allowed for the expansion of the number of codes to provide for recently recognised conditions and to provide greater specificity about common diseases (there are about 8,000 categories in ICD-10-AM as compared to 5,000 in ICD-9). While for most conditions there is a reasonable 1:1 correspondence between ICD-9 and ICD-10 codes, for some this may lead to some irregularities in time series analysis [56]. Where possible such irregularities will be highlighted in the text, although care should still be taken when interpreting time series analysis across the 1999–2000 period as some conditions may not be directly comparable between the two coding systems.

Accuracy of ICD Coding

The Ministry has undertaken a number of reviews of the quality of ICD coding in the NMDS. In one audit 2,708 events were audited over 10 sites during a 3 month period during 2001/2002. Overall the audit found that 22% of events required a change in coding, although this also included changes at the fourth and fifth character level. The average ICD code change was 16%, with changes to the principal diagnosis being 11%, to additional diagnoses being 23% and to procedure coding being 11%. There were 1625 external causes of injury codes, of which 15% were re-coded differently [57]. These findings were similar to an audit undertaken a year previously.

While the potential for such coding errors must be taken into consideration when interpreting the findings of this report, it may be that the 16% error rate is an overestimate, as in the majority of the analyses undertaken in this report, only the principal diagnosis (with an error rate of 11%) is used to describe the reason for admission. In addition, for most admissions the diagnostic category (e.g. lower respiratory tract infections) is assigned using information at the 3 digit level (with the 16% error rate also including issues with coding at the 4th or 5th digit level).

3. Ethnicity Information in the NMDS

The reader is referred to **Appendix 7** for a discussion of this issue.

Conclusion

The inconsistencies outlined above tend to make time series analyses based on the NMDS less reliable than those based on Mortality or Birth Registration data (where legislation dictates inclusion criteria and the type of information collected). While using hospital discharge data still remains a valuable and reasonably reliable proxy for measuring the health outcomes of children and young people in this country, the reader is cautioned to take into consideration the issues discussed above, when interpreting the findings outlined in this report.

APPENDIX 5: THE BIRTH REGISTRATION DATASET

Mode of Data Collection

Since 1995 all NZ hospitals and delivering midwives have been required to notify Internal Affairs (within 5 working days of delivery), of the birth of a live or stillborn baby 20+ weeks gestation or weighing >400g. Prior to 1995, only stillborn babies reaching 28+ weeks of gestation required birth notification. Information on the hospital's notification form includes maternal age, ethnicity, multiple birth status, and baby's sex, birth weight and gestational age. In addition, parents must complete a Birth Registration Form within two years of delivery, duplicating the above information with the exception of birth weight and gestational age, which are supplied only on hospital notification forms. Once both forms are received by Internal Affairs, the information is merged into a single entry. This two-stage process it is thought to capture 99.9% of births occurring in New Zealand and cross-checking at the receipting stage allows for the verification of birth detail [58].

Interpretation of Information Derived from the Birth Registration Dataset

Because of the two-stage birth registration process, the majority of variables contained within the birth registration dataset are >98% complete, and cross-checking at the receipting stage (with the exception of birth weight and gestational age) allows for the verification of birth details. In addition, the way in which ethnicity is collected in this dataset confers a number of advantages, with maternal ethnicity being derived from the information supplied by parents on their baby's birth registration form. This has the advantage of avoiding some of the ambiguities associated with hospital and mortality data, which at times have been reported by third parties. Changes in the way ethnicity was defined in 1995 however make information collected prior to this date incomparable with that collected afterwards. For births prior to 1995, maternal ethnicity was defined by ancestry, with those having half or more Māori or Pacific blood meeting ethnic group criteria, resulting in three ethnic groups, Māori, Pacific and non-Māori non-Pacific. For births after 1995 maternal ethnicity was self-identified, with an expanded number of ethnic categories being available and parents being asked to tick as many options as required to show which ethnic group(s) they belonged to. For those reporting multiple ethnic affiliations a priority rating system was introduced, as discussed **Appendix 7** of this report.

Because this dataset captures 99.9% of births occurring in NZ, is >98% complete for most variables, collects self-reported ethnicity in a standard manner and is collated and coded by a single agency, information derived from this dataset is likely to be of higher quality than that derived from many of NZ's other data sources. Limitations however include the relatively restricted number of variables contained within the dataset (e.g. it lacks information on maternal smoking, Body Mass Index or obstetric interventions) and the lack of cross-checking for birth weight and gestational age (which is supplied only on the hospital notification form). The changeover in ethnicity definition during 1995 also prohibits time series analysis by ethnicity over the medium to long term. Finally, since the last report, the Ministry of Health has stopped providing stillbirth data in the Birth Registration Dataset, and thus all analyses based on this set are restricted to live births only. Each of these factors must thus be taken into account when interpreting information in this report that has been derived from the Birth Registration Dataset.

APPENDIX 6: THE NATIONAL MORTALITY COLLECTION

Mode of Data Collection

The National Mortality Collection is a dataset managed by the Ministry of Health which contains information on the underlying cause(s) of death as well as basic demographic data for all deaths registered in New Zealand since 1988. Data pertaining to fetal and infant deaths are a subset of the Mortality Collection, with cases in this subset having additional information on factors such as birth weight and gestational age [59].

Each month the Births, Deaths and Marriages service of the Department of Internal Affairs sends the Ministry of Health electronic death registration information, Medical Certificates of Cause of Death, and Coroner's reports. Additional information on the cause of death is obtained from the National Minimum Dataset (NMDS), private hospital discharge returns, the NZ Cancer Registry (NZCR), the Department of Courts, the Police, the Land Transport Authority (LTSA), Water Safety NZ, Media Search and from writing letters to certifying doctors, coroners and medical records officers in public hospitals. Using information from these data sources, an underlying cause of death (ICD-10-AM) is assigned by Ministry of Health staff using the World Health Organization's rules and guidelines for mortality coding [59].

Data Quality Issues Relating to the National Mortality Collection

Unlike the NMDS, where information on the principal diagnosis is coded at the hospital level and then forwarded electronically to the Ministry of Health, in the National Mortality Collection each of the approximately 28,000 deaths occurring in New Zealand each year is coded manually by Ministry of Health staff. For most deaths the Medical Certificate of Cause of Death provides the information required, although coders also have access to the information contained in the NMDS, NZ Cancer Registry, LSTA, Police, Water Safety NZ and ESR [60]. As a consequence, while coding is still reliant on the accuracy of the death certificate and other supporting information, there remains the capacity for a uniform approach to the coding which is not possible for hospital admissions data.

While there are few published accounts of the quality of coding information contained in the National Mortality Collection, the dataset lacks some of the inconsistencies associated with the NMDS, as the process of death registration is mandated by law and there are few ambiguities as to the inclusion of cases over time. As a consequence, time series analyses derived from this dataset are likely to be more reliable than that provided by the NMDS. One issue that may affect the quality of information derived from this dataset however is the collection of ethnicity data, which is discussed in more detail in **Appendix 7** of this report.

APPENDIX 7: THE MEASUREMENT OF ETHNICITY

The majority of rates calculated in this report rely on the division of numerators (e.g. hospital admissions, mortality data) by Statistics NZ Estimated Resident Population denominators. Calculation of accurate ethnic-specific rates relies on the assumption that information on ethnicity is collected in a similar manner in both the numerator and the denominator, and that a single child will be identified similarly in each dataset. In New Zealand this has not always been the case, and in addition the manner of collecting information on ethnicity has varied significantly over time. Since 1996, however, there has been a move to ensure that ethnicity information is collected in a similar manner across all administrative datasets in New Zealand (Census, Hospital Admissions, Mortality, Births). The following section briefly reviews how information on ethnicity has been collected in national data collections since the early 1980s and the implications of this for the information contained in this report.

1981 Census and Health Sector Definitions

Earlier definitions of ethnicity in official statistics relied on the concept of fractions of descent, with the 1981 census asking people to decide whether they were fully of one ethnic origin (e.g. Full Pacific, Full Māori) or if of more than one origin, what fraction of that ethnic group they identified with (e.g. 7/8 Pacific + 1/8 Māori). When prioritisation was required, those with more than 50% of Pacific or Māori blood were deemed to meet the ethnic group criteria of the time [61]. A similar approach was used to record ethnicity in health sector statistics, with birth and death registration forms asking the degree of Pacific or Māori blood of the parents of a newborn baby/the deceased individual. For hospital admissions, ancestry-based definitions were also used during the early 1980s, with admission officers often assuming ethnicity, or leaving the question blank [62].

1986 Census and Health Sector Definitions

Following a review expressing concern at the relevance of basing ethnicity on fractions of descent, a recommendation was made to move towards self-identified cultural affiliation. Thus the 1986 Census asked the question “What is your ethnic origin?” and people were asked to tick the box or boxes that applied to them. Birth and death registration forms however, continued to use the “fractions of blood” question until 1995, making comparable numerator and denominator data difficult to obtain [61]. For hospital admissions, the move from an ancestry-based to a self-identified definition of ethnicity began in the mid-80s, although non-standard forms were used and typically allowed a single ethnicity only [62].

1991 Census and Health Sector Definitions

A review suggested that the 1986 ethnicity question was unclear as to whether it was measuring ancestry or cultural affiliation, so the 1991 Census asked two questions:

1. Which ethnic group do you belong to? (tick the box or boxes which apply to you)
2. Have you any NZ Māori ancestry? (if yes, what iwi do you belong to?)

As indicated above, however, birth and death registrations continued with ancestry-based definitions of ethnicity during this period, while a number of hospitals were beginning to use self-identified definitions in a non-standard manner [62].

1996 Census and Health Sector Definitions

While the concepts and definitions remained the same as for the 1991 census, the ethnicity question in the 1996 Census differed in that:

- The NZ Māori category was moved to the top of the ethnic categories
- The 1996 question made it more explicit that people could tick more than one box
- There was a new “Other European” category with 6 subgroups

As a result of these changes, there was a large increase in the number of multiple responses, as well as an increase in the Māori ethnic group in the 1996 Census [61]. Within the health sector, however, there were much larger changes in the way in which ethnicity information was collected. From late 1995, birth and death registration forms incorporated a new ethnicity question identical to that in the 1996 Census, allowing for an expansion of the number of ethnic groups counted (previously only Māori and Pacific) and resulting in a large increase in the proportion of Pacific and Māori births and deaths. From July 1996 onwards, all hospitals were also required to inquire about ethnicity in a standardised way, with a question that was compatible with the 1996 Census and that allowed multiple ethnic affiliations [62]. A random audit of hospital admission forms conducted by Statistics NZ in 1999, however, indicated that the standard ethnicity question had not yet been implemented by many hospitals. In addition, an assessment of hospital admissions by ethnicity over time showed no large increases in the proportions of Māori and Pacific admissions after the 1996 "change-over", as had occurred for birth and death statistics, potentially suggesting that the change to a standard form allowing for multiple ethnic affiliations in fact did not occur. Similarities in the number of people reporting a "sole" ethnic group pre- and post-1996 also suggest that the way in which information on multiple ethnic affiliations was collected did not change either. Thus while the quality of information available since 1996 has been much better than previous, there remains some concern that hospitals continue to undercount multiple ethnic identifications and as a result, may continue to undercount Pacific and Māori peoples [62].

2001 Census and Health Sector Definitions

The 2001 Census reverted back to the wording used in the 1991 Census after a review showed that this question provided a better measure of ethnicity based on the current statistical standard [61]. The health sector also continued to use self-identified definitions of ethnicity during this period, with the *Ethnicity Data Protocols for the Health and Disability Sector* providing guidelines which ensured that the information collected across the sector was consistent with the wording of the 2001 Census (i.e. *Which ethnic groups do you belong to (Mark the space or spaces that apply to you)?*)

2006 Census and Health Sector Definitions

In 2004, the Ministry of Health released the *Ethnicity Data Protocols for the Health and Disability Sector* [63] with these protocols being seen as a significant step forward in terms of standardising the collection and reporting of ethnicity data in the health sector [64]. The protocols stipulated that the standard ethnicity question for the health sector was the 2001 Census ethnicity question, with respondents being required to identify their own ethnicity, and with data collectors being unable to assign this on respondent's behalf, or to transfer this information from another form. The protocols also stipulated that ethnicity data needed to be recorded to a minimum specificity of Level 2 (see below) with systems needing to be able to store, at minimum, three ethnicities, and to utilise standardised prioritisation algorithms, if more than three ethnic groups were reported. In terms of outputs, either sole/combination, total response, or prioritised ethnicity needed to be reported, with the methods used being clearly described in any report [63].

The following year, Statistics New Zealand's Review of the Measurement of Ethnicity (RME), culminated in the release of the *Statistical Standard for Ethnicity 2005* [65], which recommended that:

1. The 2006 Census ethnicity question use identical wording to the 2001 Census
2. Within the "Other" ethnic group, that a new category be created for those identifying as "New Zealander" or "Kiwi". In previous years these responses had been assigned to the European ethnic group
3. All collections of official statistics measuring ethnicity have the capacity to record and report six ethnicity responses per individual, or at a minimum, three responses when six could not be implemented immediately

4. The practice of prioritising ethnicity to one ethnic group should be discontinued.

At the 2006 Census, however, a total of 429,429 individuals (11.1% of the NZ population) identified themselves as a New Zealander, with further analysis suggesting that 90% of the increase in those identifying as New Zealanders in 2006, had arisen from those identifying as New Zealand European at the 2001 Census [66]. In 2009 Statistics NZ amended the Standard to reflect these issues [67] with the current recommendation being that future Censuses retain the current ethnicity question (i.e. that New Zealander tick boxes not be introduced) but that alongside the current standard outputs where New Zealander responses are assigned to the Other Ethnicity category, an alternative classification be introduced which combines the European and New Zealander ethnic groups into a single European and Other Ethnicity category for use in time series analysis (with those identifying as both European and New Zealanders being counted only once in this combined ethnic group [67].

The Current Recording of Ethnicity in New Zealand's National Datasets

In New Zealand's national health collections (e.g. National Minimum Dataset, Mortality Collection and NZ Cancer Registry), up to three ethnic groups per person are stored electronically for each event, with data being coded to Level 2 of Statistics New Zealand's 4-Level Hierarchical Ethnicity Classification System [46]. In this Classification System increasing detail is provided at each level. For example [63]:

- Level 1 (least detailed level) e.g. code 1 is European
- Level 2 e.g. code 12 is Other European
- Level 3 e.g. code 121 is British and Irish
- Level 4 (most detailed level) e.g. code 12111 is Celtic

Māori, however, are identified similarly at each level (e.g. Level 1: code 2 is Māori vs Level 4: code 21111 is Māori).

For those reporting multiple ethnic affiliations, information may also be prioritised according to Statistics New Zealand's protocols, with Māori ethnicity taking precedence over Pacific > Asian/Indian > Other > European ethnic groups [63]. This ensures that each individual is counted only once and that the sum of the ethnic group sub-populations equals the total NZ population [62]. The implications of prioritisation for Pacific groups however are that the outcomes of those identifying as both Māori and Pacific are only recorded under the Māori ethnic group.

For those reporting more than 3 ethnic affiliations, the ethnic groups recorded are again prioritised (at Level 2), with Māori ethnicity taking precedence over Pacific > Asian/Indian > Other > European ethnic groups (for further details on the prioritisation algorithms used see [63]. In reality, however, less than 0.5% of responses in the National Health Index database have three ethnicities recorded, and thus it is likely that this prioritisation process has limited impact on ethnic-specific analyses [63].

Undercounting of Māori and Pacific Peoples in National Collections

Despite significant improvements in the quality of ethnicity data in New Zealand's national health collections since 1996, care must still be taken when interpreting the ethnic-specific rates presented in this report, as the potential still remains for Māori and Pacific children and young people to be undercounted in our national data collections. In a review that linked hospital admission data to other datasets with more reliable ethnicity information (e.g. death registrations and Housing NZ Corporation Tenant data), the authors of Hauora IV [68] found that on average, hospital admission data during 2000–2004 undercounted Māori children (0–14 years) by around 6%, and Māori young people by around 5–6%. For cancer registrations, the undercount was in the order of 1–2% for the same age groups. While the authors of Hauora IV developed a set of adjusters which could be used to minimise the bias such undercounting introduced when calculating population rates and rate ratios, these (or similar) adjusters were not utilised in this report for the following reasons:

1. Previous research has shown that ethnicity misclassification can change over time, and thus adjusters developed for one period may not be applicable to other periods [69].
2. Research also suggests that ethnic misclassification may vary significantly by DHB [69], and thus that adjusters developed using national level data (as in Hauora IV) may not be applicable to DHB level analyses, with separate adjusters needing to be developed for each DHB.

Further, as the development of adjusters requires the linkage of the dataset under review with another dataset for which more reliable ethnicity information is available, and as this process is resource-intensive and not without error (particularly if the methodology requires probabilistic linkage of de-identified data), the development of a customised set of period and age specific adjusters was seen as being beyond the scope of the current project. The reader is thus urged to bear in mind that the data presented in this report may undercount Māori and Pacific children to a variable extent (depending on the dataset used) and that in the case of the hospital admission dataset for Māori, this undercount may be as high as 5–6%.

Ethnicity Classifications Utilised in this Report and Implications for Interpretation of Results.

Because of inconsistencies in the manner in which ethnicity information was collected prior to 1996, all ethnic-specific analyses presented in this report are for the 1996 year onwards. The information thus reflects self-identified concepts of ethnicity. In order to ensure that each health event is only counted once, prioritised ethnic group has been used unless otherwise specified.

APPENDIX 8: THE NZ DEPRIVATION INDEX

The NZ Deprivation Index (NZDep) is a small area index of deprivation, which has been used as a proxy for socioeconomic status in this report. The main concept underpinning small area indices of deprivation is that the socioeconomic environment in which a person lives can confer risks/benefits which may be independent of their own social position within a community [70]. They are thus aggregate measures, providing information about the wider socioeconomic environment in which a person lives, rather than about their individual socioeconomic status.

The NZDep was first created using information from the 1991 census, but has since been updated following each census. The NZDep2006 combines 9 variables from the 2006 census which reflect 8 dimensions of deprivation (**Table 20**). Each variable represents a standardised proportion of people living in an area who lack a defined material or social resource (e.g. access to a car, income below a particular threshold), with all 9 variables being combined to give a score representing the average degree of deprivation experienced by people in that area. While the NZDep provides deprivation scores at meshblock level (Statistics NZ areas containing approx 90 people), for the purposes of mapping to national datasets, these are aggregated to Census Area Unit level (≈1,000–2,000 people). Individual area scores are then ranked and placed on an ordinal scale from 1 to 10, with decile 1 reflecting the least deprived 10% of small areas and decile 10 reflecting the most deprived 10% of small areas [71].

Table 20. Variables used in the NZDep2006 Index of Deprivation [72]

No	Factor	Variable in Order of Decreasing Weight in the Index
1	Income	People aged 18–64 receiving means tested benefit
2	Employment	People aged 18–64 unemployed
3	Income	People living in households with income below an income threshold
4	Communication	People with no access to a telephone
5	Transport	People with no access to a car
6	Support	People aged <65 living in a single parent family
7	Qualifications	People aged 18–64 without any qualifications
8	Owned Home	People not living in own home
9	Living Space	People living in households below a bedroom occupancy threshold

The advantage of NZDep is its ability to assign measures of socioeconomic status to the elderly, the unemployed and to children (to whom income and occupational measures often don't apply), as well as to provide proxy measures of socioeconomic status for large datasets when other demographic information is lacking. Small area indices have limitations, however, as not all individuals in a particular area are accurately represented by their area's aggregate score. While this may be less of a problem for very affluent or very deprived neighbourhoods, in average areas, aggregate measures may be much less predictive of individual socioeconomic status [70]. Despite these limitations, the NZDep has been shown to be predictive of mortality and morbidity from a number of diseases in New Zealand.

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